March/April–1959

Machine Accounting and DATA PROCESSING

The Magazine of Automatic Office Methods and Management

A Closer Look at Computer Feasibility

page 15

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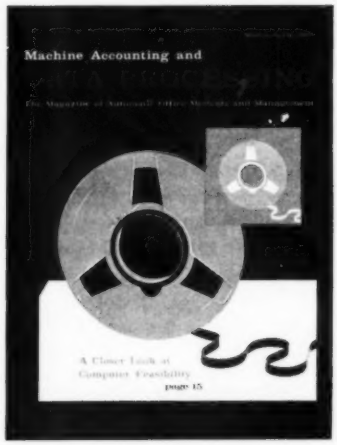
Machine Accounting and
DATA PROCESSING

Volume One • Number Three



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Also publishers of The Punched Card MACHINE ACCOUNTING and DATA PROCESSING Annual (Applications Volumes)

OBSERVATIONS . . .

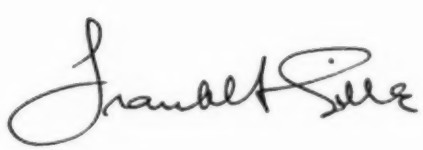
from the publisher . . .

EVEN though you may not use the term DATA PROCESSING in designating your company's activities in this area, we hope that you will welcome the new emphasis given this term in our title.

This is not meant to signify a change in the type of material this magazine presents.

There lingers, throughout the field, a "modesty" on the part of some punched card department managers to accept this new term, because their operations have become neither "integrated" with punched tape nor "electronicated" with a high speed computer. However, *data processing primarily revolves around punched cards and punched tape,* at the present, and will undoubtedly continue to do so for many years to come. We strongly believe that the acceptance of this term by punched card people is a big step in *upgrading* their activities in the eyes of management and the general public. Such a standardized designation would foster a better understanding and benefit everyone engaged in this field of activity.

Magazines, like books, should not be judged by their covers or their titles. Therefore, the inside pages of ma & DP will continue to bring you insight, ideas and information on all phases of punched card, punched tape and computer activity.



CONTENTS

Special Feature

- FEASIBILITY STUDIES by Oswald Nielsen 15
- MEDIUM-SIZED COMPUTERS by Ned Chapin 18
- SMALL SCALE COMPUTERS by Mortimer J. Sullivan 22

Much has been made of "giant brains" and all that they can do. In looking at the forest of automation, the trees of computers have become lost in the panorama of wonder. Here, the types of trees that make up the forest are discussed. As a result of feasibility studies, a decision is made as to size and type of computer to order. There are many varied and capable medium and small scale systems that can be utilized very effectively to implement the recommendations of a computer feasibility study.

Features

- DATA PROCESSING HORIZONS by Jim Rosenzweig 6

In attempting to "look" into the future of data processing it is necessary to look back. Only by past performance can an educated guess be made as to what the future holds.

- DATA PROCESSING AT B.O.A.S.I. by Emily R. Willard 10

Highlights of a unique survey made on an IBM 705 of the more than 120 million accounts in the Social Security Administration. There is a count of some common and uncommon names. Humorous—and interesting.

- MANUFACTURING APPLICATIONS OF PUNCHED CARD EQUIPMENT by C. J. Craft.... 12

Since the very recent advent of data processing machines at bargain basement prices, the use of punched card accounting again comes to the fore. For numerous companies too small for computers, the low-cost punched card equipment now available opens the door for them to take advantage of data processing, especially for manufacturing applications.

- SIGNIFICANT DEVELOPMENTS IN COST CONTROL by Harold H. Schaff 25

Mr. Schaff discusses the application of cost control methods to business and the data processing department. In this latter area he points out the containment of paperwork costs by computer data processing and also highlights the significant idea that the costs of data processing itself come under the principles of sound cost control.

- SAMPLING TECHNIQUES IN ACCOUNTING by Ed Flamm 28

A sampling method developed and used by the United States Government is set forth as a useful and timesaving concept for auditing and accounting purposes in business. To illustrate, an example, tables, and instructions for their use, are given.

- ORGANIZATION AND ADMINISTRATIVE FACETS OF THE TABULATING DEPARTMENT by H. B. Neander 30

If you already have a data processing department the principles outlined will serve as a review and measurement standard. If you are planning or installing such a department, the experiences and norms, gleaned from an actual case, will save you valuable time and provide insight in ways to avoid errors.

Departments . . .

- OBSERVATIONS 1
- DATA PROCESSING FORUM 5

- PRODUCTS AND SERVICES 38
- PEOPLE AND PLACES 42
- USEFUL LITERATURE 44
- CALENDAR 44
- ma & DP BOOK SHELF 46
- EDITORIAL: "Selecting Programmers for Business Computers" 48

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He is a member of the American Management Association, the Association for Computing Machinery, the American Economic Association, the American Institute of Industrial Engineers and the Operations Research Society of America.

MORTIMER J. SULLIVAN *("Small Scale Computers")* joined the staff of "Machine Accounting and DATA PROCESSING" as managing editor in February. Prior to this he was an Associate Editor and Operations Manager with Automation Consultants, Inc., as well as a participant in a data processing seminar in conjunction with the Empire State Chapter of SPA. He had been a sales representative with IBM's Service Bureau Corporation in New York City. Mr. Sullivan received a Bachelor of Science degree from Fordham College and attended Fordham Law School. He has also had long and varied business experience with commercial and savings banks in New York City and Yonkers, New York.

JIM ROSENZWEIG *("Data Processing Horizons")* is consultant to the office of Product Research at Boeing Airplane Company in Seattle, Washington as well as Assistant Professor at the University of Washington. His main fields of endeavor have been data processing, business research and policy and administration. Previous to his current assignment, he was special consultant in data processing for Boeing. Mr. Rosenzweig, who holds a Ph.D. from the University of Illinois, has authored several books and many articles.

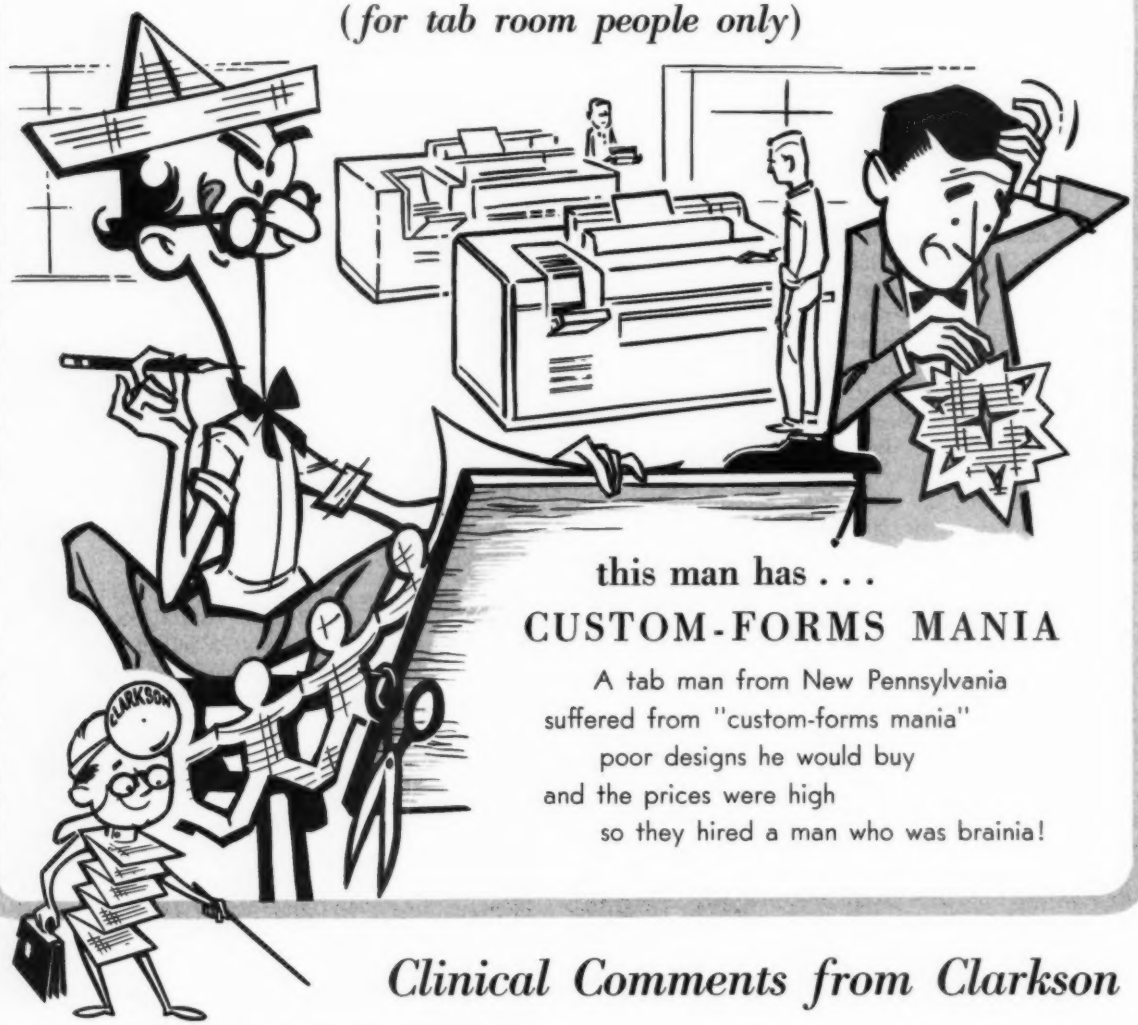
CLIFFORD J. CRAFT *("Manufacturing Applications of Punched Card Equipment")* joined Peat, Marwick, Mitchell & Co. in November, 1958 as a Manager in their Management Controls Department. Previously he was with the American Management Association as Manager of the Manufacturing Division. He also served as Manager of the Finance Division and was responsible for all meetings in the areas of operations research, electronic data processing, finance and accounting. Also, he served as Director of Special Projects and was responsible for development of the AMA Top Management Decision Simulation Game. Mr. Craft holds three patents for electronic switching inventions and has published a number of articles on electronic data processing and operations research in business and professional journals.

HAROLD H. SCHAFF *("Significant Developments in Cost Control")* was graduated from New York University, School of Commerce, Accounts, and Finance. He joined the accounting and financial staff of Electric Bond and Share Company in 1923. In 1940, Mr. Schaff was appointed Comptroller of Ebasco Services Incorporated, which is the technical service subsidiary of Electric Bond and Share Company. After serving in that position for three years, he was appointed Vice President in charge of the Financial Section of the Company. Recently he was assigned the responsibility of supervising all management consulting services rendered by the Company. He has served as a Director of that Company since October 1940.

(continued on page 36)

OCCUPATIONAL DISEASE No. 1

(for tab room people only)



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Data Processing FORUM

QUESTION – "Who Should Initiate Automation Feasibility Studies and Be Responsible for Them?"

William Carroll,
Comptroller,
Maust Coal and Coke Corporation,
New York, New York.

IT DEPENDS on the size of the company but usually the controller or comparable officer should initiate feasibility studies. If a company is very large it may be the head of the systems and procedures department or the general manager of an operating division. However, no matter who initiates it, one individual is assigned to head the group and he usually receives the responsibility to put such study into effect. The group may consist of one person or of several persons.

The group's findings, however, are recommendations to top management and it is then up to top management to act on the recommendations. The decision is theirs, based on the feasibility study group's findings.

H. W. Rice, Jr.,
Manager, Shulton, Inc.,
Clifton, New Jersey.

SUCH A STUDY, if not initiated by the vice-president in charge of finance, should, at least, be approved by him. Without a key officer of the company backing the project, it will be that much more difficult to get the ball rolling and keep it rolling in this area. Very often the recommendations of a feasibility study will include extensive reorganization, as well as investment in changeover, so that the final approval or disapproval of these findings can only be made by the financial officer, president or the board of directors.

Speaking from my own experience, an officer of a business organization initiates the study on his own. He realizes the importance of keeping abreast of new business methods and ideas.

Harry J. Schneider,
Manager,
Machine Accounting
Exquisite Form Brassiere, Inc.,
New York, New York.

IT IS ABSOLUTELY ESSENTIAL that some key executive of a company direct, conduct or approve such a study. The executive should be vice-president of operations or finance, or at the least, controller. The study many times is initiated by such an executive but he may not be able to actively participate in the research due to the pressure of other duties. However, you cannot expect to gain much cooperation unless you have the sanction of a member of top management. His backing may not mean final acceptance of the facts or findings of such a study, but the survey itself will progress without becoming bogged down in trivia of petty objections. It is much easier to work from the top down than to work up to it. ■

Data Processing Horizons

"When the history of our age is written, I think it will record three profoundly important technological developments: Nuclear Energy . . . Automation . . . and Computers . . . Some of our engineers believe that of these three, the computer will bring the greatest benefit to man."

STATEMENTS SUCH AS THIS ONE by Ralph Cordiner, President of General Electric, put a great deal of pressure on people connected with the field of data processing involving computers. It is a high calling, like being picked first in a conference football race. The pressure is on and those under fire must produce.

What exactly are the claims that have been made for the computer in its role in office automation? The list could be lengthy but here are representative examples:

1. The computer can do work (*suited to its talents*) faster and more economically than any other equipment.
2. The computer is more accurate than people or present machines.
3. The computer can importantly expand the scope of present mechanized systems by absorbing the quasianalytical functions of clerical work.
4. The computer can easily perform operations previously considered impractical if not impossible in the area of analysis and research.

By Jim Rosenzweig

What is the record with regard to each of these claims? As far as speed and accuracy are concerned there appears to be no doubt that the electronic computer has measured up to its advance notices. Although the transaction speed in most systems is already fantastic, product research people assure us that machines many times faster will be available within the next three to eight years. With proper programming and clean input data, the electronic computer leaves little to be desired in the way of accuracy. The evidence is not entirely clear with regard to the economics of business data processing installations. In some cases, substantial savings have been made; in other cases, no significant differences have been apparent; and in still others, costs have risen. Applications originally scheduled for the computer have in some instances been reassigned to electro-mechanical or manual processing because the predicted savings just did not materialize.

Undoubtedly, the electronic computer has facilitated rapid advancements in the field of quantitative management, the application of mathematical and statistical techniques to business decision-making. But this area of application is completely separate and distinct from that of business data processing. The two should not be confused.

For points 1, 2 and 4 above, it is clear that the electronic computer has come quite a way toward fulfilling all the claims made for it. However, the third statement—the computer can importantly expand the scope of present data processing systems—must be analyzed in more detail. The computer certainly provides a powerful tool which might well be used for expanding the scope of present systems. And, this very point is the most significant contribution of the electronic computer to business data processing. The fact that the computer is such a powerful tool and such a long stride away from its forerunners (*electro-mechanical equipment*) provides systems analysts with a real opportunity for redesigning the system of information flow for their company. Yet it is in this area that relatively little progress has been made. Why?

Computers' Potential Not Fully Used

There are many reasons why the full potential of electronic computers has not been realized in the

majority of present installations. The following list is only representative; it could be extended or modified for any particular case.

1. Too much emphasis was placed on immediate cost savings.
2. This lead to the adaptation of existing systems and procedures to electronics, the result being faster processing of the same old system of information flow.
3. The emphasis on immediate results and substantial cost savings also led to the predominance of piecemeal approaches with little regard for the overall picture. Integrated data processing was often considered a "cloud nine" concept, something to be discussed at conferences but for the other fellow to install. *"Our operation is different!"*
4. Top management has not always been as well sold on electronic computers as might be hoped for by those in the field. This attitude has, of course, fostered the situations outlined above. In addition, the lack of staunch support from top management has made a very difficult task out of the job of selling departments affected by the computer.

In general, the problem in most data processing installations has been the preoccupation with *"brush fires"* at the expense of time which should be devoted to long-range planning. It is not a new problem; administrators in other functional areas are similarly plagued. However, concerted efforts must be made to focus on the long-range aspects of the data processing function in order that optimum results can be obtained from such a powerful tool. A complete re-evaluation of the company's system of information flow must be undertaken in order to provide a proper frame of reference for the applications that are placed on the computer. If each such application is related to the overall plan the ultimate result should be a completely integrated data processing system.

Attention in this discussion will be focused on the outlook for data processing systems over the next six to eight years. So far, an attempt has been made to outline the claims advanced for computers and to evaluate in general how successful data processing installations have been in meeting the challenge. Before launching into a discussion of what the future holds, it would be well to trace the history of electronics in business data processing. As a vehicle for this analysis, a series of data processing acronyms will be utilized. The trend in names or "tags" is a pretty good clue to the types of equipment and systems which are being developed.

Data Processing Acronyms

The names of various types of computing systems existing today stem from many different sources. No convenient and standard system of nomenclature has been established; hence, an odd mixture of names for computing systems and installations has developed. Many computing systems bear the name of the manufacturing organization, *for example*, IBM 705, Litton 20 or NCR 304. Some names indicate the purpose of the system, others indicate the location of the installation, and still others indicate the name of the operating agency. The names of some machines are trade names like UNIVAC II and ELECOM 125. The names of individuals have sometimes been attached to a system or installation but perhaps the most popular approach has been the development of names which are contractions or pronounceable abbreviations of significant titles, such as ENIAC, UNIVAC, MANIAC, GENIAC —among the AC names and, amongst their affectionate groups of organized users, such names as BETSIE and SHARE. In automatic programming there are: SOAP, SCAT, PRINT, FLOP and QUEASY. A rather unique and appropriate name has been selected for the installation serving four New England insurance companies: SPAN, composed of the first initial of the four users' company names.

C. B. Williams, Director of Data Processing for the group, points out that Webster defines *"span"* as the archaic past of *"spin"* which means: to whirl; to revolve, as a top; to feel as if revolving, as one's head. Since debugging a computer program is often enough to make anyone dizzy, the name is eminently fitting.

Jazz addicts should appreciate the following two tags: CATS and RAMAC. Oracular names include ORACLE and SAGE. The tag given the data processing installation at Certified Grocers in Los Angeles is particularly appropriate to the discussion here at hand, data processing horizons. It is SCOPE (*Sequential Customer Order Processing Electronically*). Just the name alone gives an impression of the overall picture and of long-range planning. And the ultimate system of data processing proposed for this particular installation seems to be somewhat of a *"cloud nine"* concept. The inventory of this huge wholesale grocery operation has been converted from punched cards to computers and substantial savings have been made. However, this step is only the beginning; the ultimate system calls for the inventory in all the member retail stores to be checked in a central file. In this way, the wholesale operation could automatically write up an order and ship the merchandise without the retailer bothering to check his stock. How soon? Maybe 1965.

Data Processing—Past, Present and Future

In the beginning, the computer was used exclusively for scientific computations of data reduction. Naturally, the particular piece of equipment in use dictated the type and scope of problem that could be tackled. Later, it was decided that the same type of equipment could be utilized to process business data also. Here again the particular piece of hardware installed dictated the scope of the data processing operation. An oft heard cry was that internal speeds were faster than need be and that input-output speeds were not fast enough.

The normal approach was for the equipment manufacturer's representative to spend a considerable amount of time helping to install a system of data processing that had been successful elsewhere. The key factor in the planning stage was always the hardware and its capabilities. Most systems analysts were happy to accept the help from outside.

As time passed and industry data processing people became more sophisticated, there developed a feedback of information from the field to the product research departments of the various equipment manufacturers. In this way, some of the changes and advances in equipment design were fostered by suggestions from data processing personnel in the field. However, the changes were seldom radical; they were often just modifications of existing pieces of hardware.

The goal should be a complete system of information flow for a company without regard for any particular equipment. Certainly, the systems analyst has to be cognizant of possible equipment capabilities in the future. However, this does not appear to be a severe limitation since product research people assure us that in 1965 speed will be no problem and that memory space and access time will be such that in-line, or real-time processing, will be entirely feasible. Yet, just because such a system would be possible is not sufficient reason to incorporate it. The systems analyst must decide what would be the optimum for his particular situation—be it real-time or batch processing.

Special Purpose Equipment

The special purpose systems that can be found in industry today attest to the fact that the system design can come first with the equipment following. The various reservation systems of the airlines (*Reservisor, etc.*) are good examples. The banking industry is another good example, SONIA and ERMA. The Bank of America has developed a special purpose piece of equipment for its own use but this same device will eventually have widespread acceptance and use throughout the banking industry. Naturally, equipment manufacturers shy away from special purpose equipment because of the smaller market for each model. However, if the old adage *"the customer is always right"* still has meaning, there is likely to be a trend toward computer installations that are at least special for a given industry.

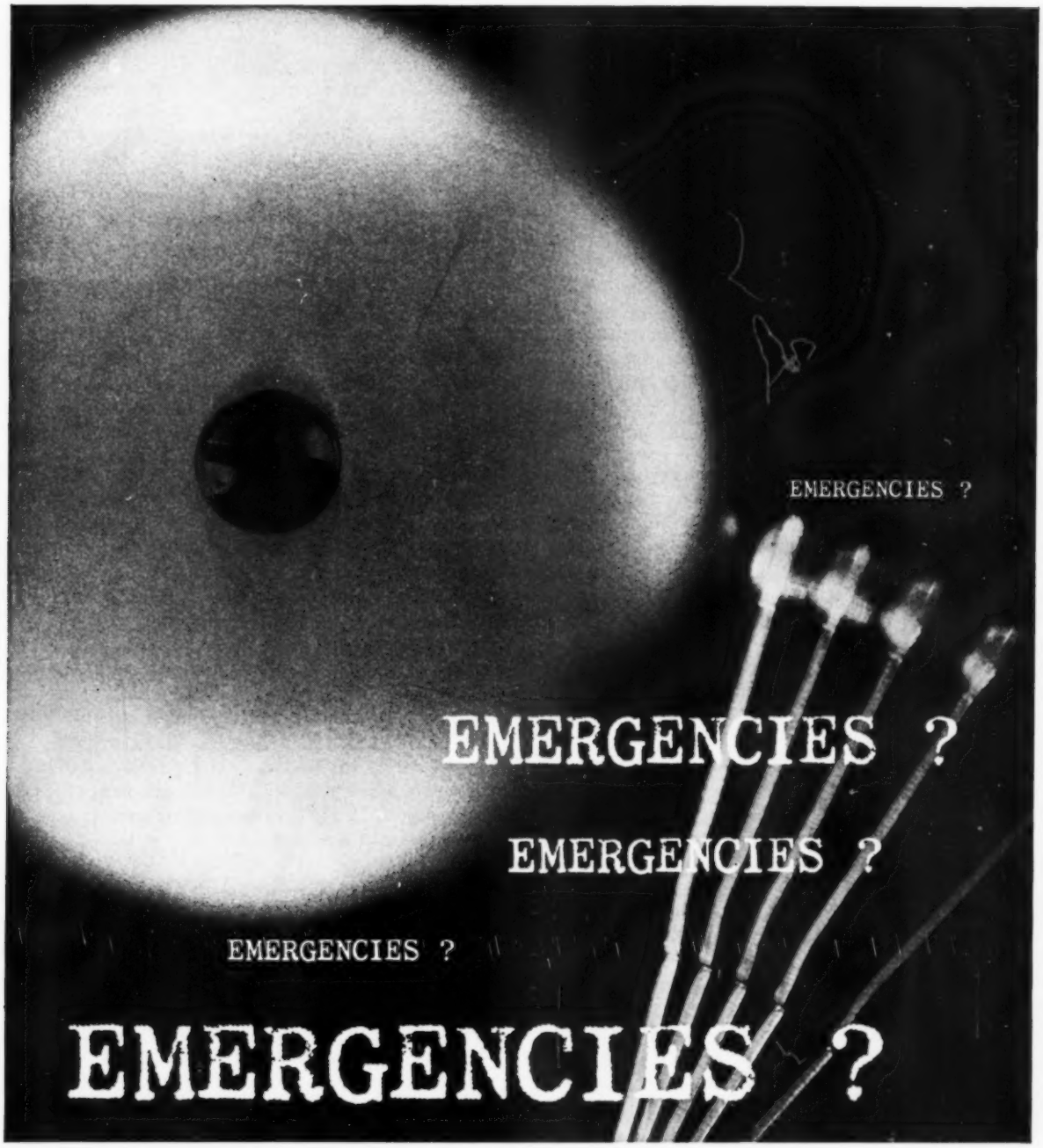
For example, the insurance field might require one type of equipment and metal fabrication companies, another. In the future it should become feasible to produce a sufficient volume of both models. There obviously must be some compromise—each company cannot have an individually designed computing system, at least not at present or for the foreseeable future. However, this still should not deter systems analysts from designing the optimum system of information flow for their particular operation. Then if they must back off a little because of equipment limitations, they are still ahead of the game.

In order to get the go-ahead from top management for an overall re-evaluation and re-designing of the present system, a super-selling job must be accomplished. Data processing must be properly established at a level high enough in the organization to facilitate the considerable amount of revamping that should be done. Only in this way will the vast potential of the electronic computer be realized. The systems analyst must look beyond the present machine capabilities when designing an optimum system for any given operation. Only then will he be on the way toward 1965's data processing horizons. ■

HOW TO RUN AWAY FROM A DATA PROCESSING PROBLEM

To facilitate the arguments of the skeptics who will staunchly maintain *"It can't be done,"* or *"Yes, but our operation is different,"* the following list of steps, developed at the University of Chicago, has been modified slightly to fit the data processing field. This list is dedicated especially to those who have not made an effort to RETHINK their system of information flow.

1. Profess not to have THE answer. That lets you out of having any.
2. Say that you must not move too rapidly. This avoids the necessity of getting started.
3. For every proposal set up an opposite and conclude that the middle ground (no motion whatever) represents the wisest course of action.
4. Say that the problem cannot be separated from other problems. Then it can't be solved until all other problems have been solved.
5. Ask what is meant by the problem. By the time it is clarified, it will be too late.
6. Discover that there are all kinds of dangers in any specific formulation of conclusions; danger of committing the organization too deeply; of having your statement in the hands of the wrong people; etc.
7. Appoint a committee without clarifying its function.
8. Wait until an expert can be consulted.
9. State in conclusion that you have all clarified your thinking—this obscures the fact that nothing has been done.
10. Point out how the deepest minds have struggled with the same problem. This implies that you deserve credit for having even thought of it.
11. In closing, thank the problem. It has stimulated discussion and investigation, contributed to your growth, opened up new vistas, shown you the way, and challenged your inventiveness. You may have wasted two perfectly good years, but the problem would get a medal.



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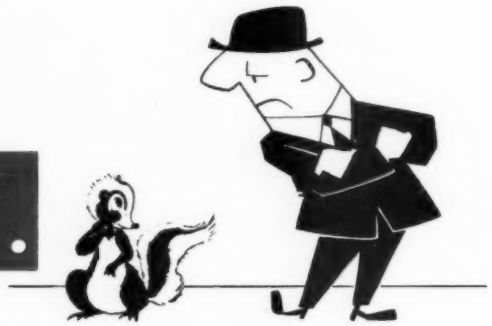

By Emily R. Willard

What's in a Name and How Many Times a Name

THERE ARE PEOPLE in the U. S. named Tattoo, Skunk, Noodle and Slob, and 600 answer to the name of Goon. A somewhat definitive count of last names in this country has finally been made, thanks to the IBM 705, in use by the Social Security Administration.

The Bureau of Old Age and Survivors' Insurance had long used punched card procedures to handle records for the 120 million social security account number holders. But because of the limited storage capacity of the 80-column card, the need for more advanced methods became acute and in 1956 the bureau installed its first IBM 705 data processing system.

The information on a punched card can, of course, be accommodated on less than a half-inch of magnetic tape and one reel can contain the records of 52,000 workers. Conversion to the new system required transferring information from 120 million summary cards onto magnetic tape, probably one of the largest card-to-tape operations ever undertaken.

Once the master information was on magnetic tapes the annual processing run provided for updating this information by means of another tape which contained the current activity. Various by-products, such as an up-to-date balance forward punched card could be obtained, itself necessary to provide a simple random access memory.

Counting Our Names

However, one of the more interesting products of the new system is the increased ability to obtain statistical information. A variety of statistical information is obtainable, but most recently a survey was made of the Christian and family names prevalent in today's America.

Altogether there was, in this country, over a million different surnames. Interestingly enough, about 70,000 of these are shared by less than ten people. John Onlyone is, *for example*, the only one with that name in the file. And Demetra Xixi is also a unique name. But there are 244 people named Trouble. And there are citizens named Damn, Oaf, Alone and Aloof.

With regard to first names it can be estimated that one out of every 32 women in the United States is named Mary—there are 2.5 million with this name. There are over 40,000 "*Mary Smiths*" alone. With regard to men, there are even more "*Johns*" than "*Marys.*" One out of every 28 men in the United States has the first name of John.

This tabulation of most common names was a by-product of a study concerned with whether the Social Security Administration's National Employee Index can be converted from typed strips to microfilm. On flexible strips inserted in metal panels and hung on racks like pages in a book, the full mammoth file takes up a city block of floor space. Furthermore, the files are growing at a rate of three million names a year.

A Lot of Data

Another need for the latest electronic equipment is that every three months the nation's employers report the wages paid to more than 58 million employees. In addition, once a year seven to eight million self-employed people report the amount of their earnings from work covered by social security and farmers send in their annual reports on more than two million hired hands. This is a lot of data to process.

To complicate matters, the Social Security Law makes it necessary to keep complete records on worker's earnings over the past five-year period. It is interesting to note that if an extra punched card were used to provide the necessary storage, it would mean an expenditure of $350,000 just for cards and files, and the handling charge would be increased by about $250,000 each year.

Speed is also a "*must*" since in addition to the routine processing, it is necessary to find the correct account numbers for people whose earnings have been reported under a number which does not match the one in the records. About nine million such incorrectly reported earnings items are received each year. The manual cost of correcting such errors in itself amounts to about several million dollars each year.

Business Reports Earnings on Tape

One of the advantages of the electronic system installed by BOASI is that the larger companies can send in their own report directly on magnetic tape—prepared automatically on their own equipment. The General Electric Company was the first to avail themselves of this opportunity. Other big firms have now also begun to make their quarterly reports on magnetic tape, as a by-product of regular payroll operations.

One difficulty is the incompatibility of some equipment. IBM computers can't use tapes magnetized on Remington Rand UNIVACs. But equipment is now on the market for translating languages from one computer to another.

In G. E.'s case, a neat little two-pound package of tape has replaced 900 bulky pages of typewritten reports. And it has been demonstrated that a tape can travel like any other piece of freight without losing a word of its magnetized messages.

Recently, the Combustion Engineering Co., Inc., manufacturers of atomic reactors, began sending their reports in on tape prepared on an IBM 650. Only a few very large companies have IBM computers in the 700 series, but over a thousand companies are now using IBM 650's. And when suitable automatic translating equipment is available, or when tapes from different manufacturers are standardized, the possibility of submitting reports which are an automatic by-product of payroll operations means a big savings in paperwork, manpower and money.

The Social Security Administration believes that its own costs for fiscal year 1959 will be at a level some $1.8 million less than if conventional equipment were used. Two 705's are now in operation and a third electronic data processing system will be installed in fiscal year 1960. The types of applications are also, of course, increasing.

A special group of prominent businessmen was invited by the Secretary of Health, Education and Welfare to take an outsiders' look at the Bureau of Old Age and Survivors' Insurance. Their report emphasized that the Bureau is carrying out its mission in a sound and vigorous manner, and stated that, *"it should be a source of satisfaction . . . that the Bureau has been a pioneer in the very difficult matter of introducing automatic machinery into the paperwork area with substantial savings . . ."*

However, in addition to savings in money, more accurate and faster record processing, and many valuable statistical studies, even the devotee of machine accounting and data processing is still most likely fascinated by the information uncovered about names. And so we're happy to let you know that there are people named One and people named Once. And Dont and Wont and None. And, in closing, we might mention that there are quite a few people named End. ■

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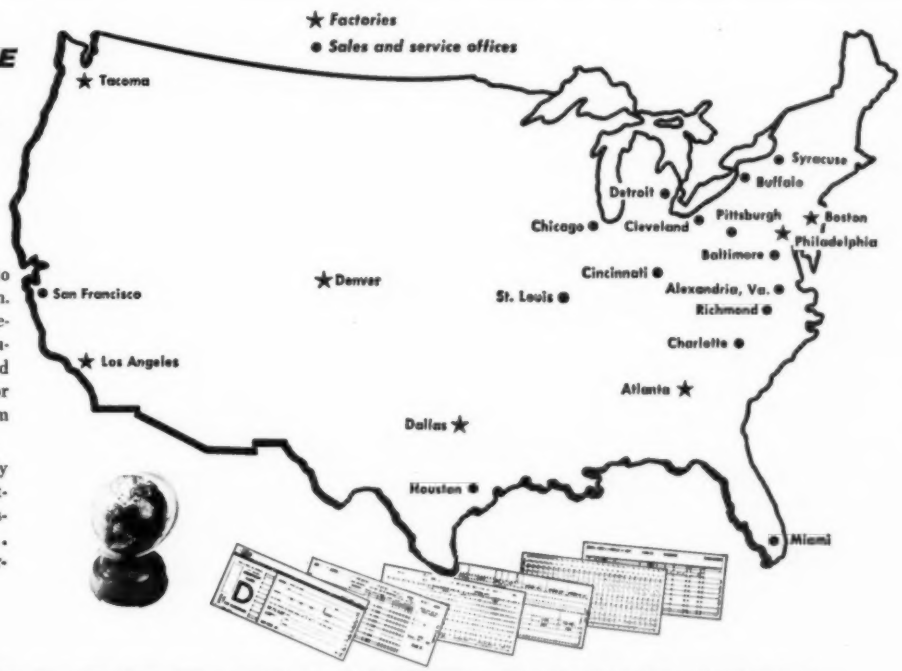

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Manufacturing Applications of Punched Card Equipment

An Actual Case Study of Outstanding Utilization of a Punched Card Application

SINCE THE ADVENT OF ELECTRONICS in data processing, much has been written on the use of computers for manufacturing applications. The vast data requirements for production problems such as inventory control, product explosion and parts requirements has focused attention on large-memory tape and drum storage machines. As a result, very little consideration has been given in the past few years to punched card equipment for manufacturing applications.

This situation is strange when one considers that potential users of data processing equipment are small and medium-sized companies. Unquestionably punched card equipment will serve these companies best.

Interest in punched card methods was highlighted at a recent meeting of the American Management Association. At the request of some of its members AMA has set up a series of seminars on the uses of punched card equipment. One of the first meetings, an Orientation on Manufacturing Applications of punched card equipment, was held last November. At this meeting several companies presented novel uses of punched cards which permitted them to use their equipment for a wide variety of manufacturing applications. These included the difficult problem of shop loading. In January a similar seminar on Production and Inventory Control Applications of punched card equipment was held.

To get some idea of the wide range of possible punched card applications in manufacturing, let us consider a few of the important problems facing production executives and point out "where" and "how" punched card equipment can be profitably used in the following areas of manufacturing:

1. Parts Requirements and Inventory Control
2. Shop Loading
3. Factory *(Incentive)* Payroll
4. Expense Control

By C. J. Craft

Parts Requirements

The basic requirement of all production planning is the determination of material and parts requirements. This may take the form of "exploding" either customer orders or sales *(or production)* forecasts to obtain the total amount of material and parts required during future production periods. Once such total requirements have been determined, it is relatively simple to determine whether sufficient quantities will be on hand when needed and to maintain perpetual inventory records. Manufacturers most frequently use punched card equipment for parts requirements and inventory control. While this problem is more easily handled on an electronic computer with its large internal storage capacity and calculating versatility, many companies have used punched card equipment successfully.

In one punched card application reported, an engineering and manufacturing firm has been able, by more accurate requirements forecasts and tighter inventory control procedures, to cut their inventory in half at the same time they increased the percentage of orders shipped from stock. Interestingly, this was accomplished during a period when sales increased over 20%. In this case, the company has

no ledger cards for their various inventory items. They simply list sixteen copies of the daily inventory status for distribution each morning.

Production Planning and Shop Loading

Production control is usually the most cumbersome to mechanize with punched card equipment. Unless certain conditions are met the use of this equipment will only compound existing problems. Before mechanization is attempted, a company needs a sound parts numbering system, effective inventory control, reliable production forecasts *(if customer orders are not used)*, and accurate input data. While all of these system requirements are rarely found together, production scheduling is probably the next most frequently used manufacturing application of punched card equipment.

The same engineering firm referred to above reported that by means of a *"modified front loading"* approach they are using their punched card equipment for weekly shop loading by work center. The actual sequencing of jobs through the shop is done manually. This determines the various set-up times needed for the loading operation on their punched card equipment. After the loads by work center have been determined, they are able to decide whether to add to inventory *(to fully load the various work centers not at full capacity)* or to leave the workers idle.

This part of the company's operation also is determined with a high degree of precision. They forecast their requirements by item so accurately that they know their inventory needs within 1%. In other words, they decide simply whether they should produce inventory for stock with the excess manpower capacity *(as indicated by the loading operation)* or whether they will let the workers remain idle. Incidentally, this company's production operation is not highly standardized. They cannot even use a pre-punched card because of a high degree of engineering changes from one job to another. They key punch each new job.

Factory Payroll

Frequently, the first application which many companies consider for punched card equipment is payroll. Generally, it is already the most highly mechanized and most likely on bookkeeping machines. While office and exempt payrolls are relatively simple to convert to punched card equipment, factory payrolls tend to be a little more *"sticky."* Even without incentives, the variety of rates, exceptions, etc., make it difficult to develop a simple machine procedure. However, with the decided trend to the standard and average cost system, there has been strong pressure to mechanize factory payroll on punched card equipment so that the distribution of labor expense can be obtained automatically as a by-product of the payroll operation.

Another company described a rather complicated incentive payroll *(allowed hours)* and distribution that had been very successfully programmed on a relatively small punched card installation. Using mark sense time cards, this company processes their weekly factory *(incentive)* payroll for 1,000 persons on their direct labor rolls using only one sorter, one collator, one calculator *(IBM 604 with a 521 punch)* and one tabulator *(402 with a 523 punch)*.

In 1957 alone this company measured $37,000 in savings from mechanized operations. Moreover, nothing was included in this estimate that was not done prior to the installation. This company also uses their payroll data for a weekly labor distribution. Material requisitions are similarly distributed for their monthly material expense distribution.

Expense Control

With today's trend toward the integration of operations, expense control is becoming more frequently a logical by-product of payroll and inventory control operations. Time cards which provide the key information for a straight hourly or incentive payroll can be used, with little additional information required in the cards, to obtain direct and indirect labor expense distribution.

Similarly, material requisition cards used to update a mechanized perpetual inventory system can, with little additional information required in the cards, be used to obtain a material expense distribution. Obviously, such integration of related operations substantially reduces the effect of the *"fixed costs"* of preparing and controlling the input or source documents.

Conclusion

Manufacturing applications of punched card equipment, as opposed to clerical applications, are characterized by their dissimilarity. Very few manufacturing programs are alike, whereas many office applications are similar. Notwithstanding the complexity and dissimilarity of manufacturing operations, more and more small and medium-sized companies are successfully applying their punched card equipment to production operations. These profitable applications clearly demonstrate some of the well-known, but often overlooked, advantages of punched card installations:

1. Flexibility of punched card systems and ability to modify and adjust programs easily and quickly.
2. Accessibility of information in a punched card system; for example, the accessibility of records of work-in-process inventory.
3. Ability to handle low-volume operations in an efficient and economical manner.
4. Relatively low operating costs.
5. Ability of cards to classify information. ■

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COVER FEATURE

Feasibility Studies

A Closer Look—But Not Necessarily at Large Size Computers

By Oswald Nielsen

General Thoughts and Objections

FEASIBILITY STUDIES relative to the installation of electronic data processing equipment are thought of as those preliminary reviews which are made to **(1)** appraise the desirability of installing such equipment, **(2)** determine the make and capacity of equipment to be installed, and **(3)** see what preliminary preparations must be made before any sort of contemplated equipment can be installed. The first objective is the true feasibility study, while the other two are incidental studies that are so well integrated with the feasibility study itself that they may, for all practical purposes, be considered as part of the feasibility study itself.

There are certain general observations which may precede any feasibility study in itself. They relate to the objectives which management has in mind relative to its decision as to whether or not electronic data processing equipment should be installed. First, there is the question as to whether or not the machine can do present jobs either with the same methods and the same pattern of data flow or by improved methods. Secondly, there is the question as to what new jobs heretofore undone may be put on the new equipment which has been projected for use.

Another question of importance is the relationship of electronic data processing to managerial organization within the company itself. Thus in the case of a strongly centralized management, decisions relative to the installation of electronic data processing equipment may recognize the fact that a large data processing machine is an expensive item regardless of whether it is rented or purchased outright and, therefore, the large machine needs a substantial volume of data processing to make itself economical. Such a large volume is available in a big organization; a centralized management tends to have information converge at some focal point. The larger the volume of such information, the greater should be the return in the way of savings by the use of electronic data processing equipment. It is here that the centralized management of the large concern makes possible the use of the large machine.

In the case of a decentralized management, such as is found in a highly divisionalized operation, there has been the desire to give various individuals an opportunity for independent managerial activity with respect to segments of the business. A large computer which would require the centralization of data might threaten such a decentralized organization, and, therefore, might not be desirable equipment in consideration of the fact that decentralized operation may be desirable. In such a case, one of two solutions must be found if electronic data processing equipment is to be used. One alternative is to use a smaller-sized computer whose capacity is limited to the requirements of one of the decentralized divisions of the company

itself. Another alternative is to use a larger computer and to centralize those elements of data processing which will not interfere with the decentralization of management. Some such matters of data processing might pertain to payrolls or the payment of vouchers. It must be recognized, however, that the centralization of routine data processing would not necessarily enforce a centralization of management. On the other hand, if the centralization of data processing involves matters of a decision-making nature, then the installation of centralized data processing would likewise enforce a tendency toward the centralization of management.

The Small Company and EDP

The question sometimes arises as to what a small company can do in the way of installing electronic data processing equipment, and it is sometimes said that electronic equipment is too expensive for the small company. It is therefore recommended that the small company resort to such devices as systems which enable single writings or use of various posting machines or even punched card methods. None of these has the advantageous feature of facilitating any automatic decision-making work. Suck items as *"write it once"* systems will not even perform simple arithmetic computations and certainly do not sort information. These routine steps must still be done by hand. Much of the same is true of posting machines. A small company looking for automatic data processing equipment needs to find equipment for which one does not have to pay for capacity in excess of one's needs, but which will permit automatic computation, make automatic previous balance pickup, and will automatically arrive at the final data needed for various elements of the decision-making process in modern business.

Outlining the Project

With these preliminary considerations in mind, the first step in connection with a feasibility study is to outline the project. The first element in outlining the project is to state the problem which confronts the business itself. Questions to be resolved in stating the problem are: *What do we need to get out of the equipment? What are the difficulties that we are trying to overcome by the possible installation of equipment?* Secondly, it is important to plan a method of approach to the problem. *What factors need to be examined and what personnel will be needed to make the examination in order to answer the questions which are required?* A third important element with respect to approaching the problem is to formulate some reasonable time schedule for the conduct of the work. Without a time schedule, it is possible that the investigation will continue so long that the entire problem which the company has will change, while the characteristics of equipment also change, since both of them are in constant transition. Relative to this third element comes the question as to whether or not one should delay both the feasibility study and the installation of equipment, about which some thoughts appear below.

Included in making an analysis of the problem is the determination as to whether or not a detailed or general study should be made. Obviously, a detailed study will necessarily have to be protracted over a longer span of time. A general over-all study based upon good sampling and intelligent estimating will shorten the period of time. The detailed study is advantageous in the situation where the desirability or nondesirability of the equipment depends upon how various detailed elements of management can be integrated into the electronic data processing system. General studies involving over-all samples and perhaps a certain amount of guesswork may apply in cases where one or at most a few considerations determine whether or not the installation of equipment would be desirable.

Immediate and Long Term Considerations

Another consideration in conducting feasibility studies is the weight that should be given to *immediate* in contrast to *long run* considerations. If immediate considerations are the important ones, they usually involve elements of specific data processing such as the handling of large numbers of invoices, the issuing of premium notices, computation of payrolls, or figuring commission statements. In addition to the matter of processing masses of data, a longer term approach will also be concerned with matters of improved methods and the addition of analysis not heretofore used in the managerial sphere.

An important preliminary to determining the feasibility of installing electronic data processing equipment is to study the data flow in the company. First, it must be determined if the data flow is presently satisfactory. If it is not, then the next question is whether or not the flow can be adapted or improved in such a manner as to permit its handling by large scale mechanical means. The major objective of this examination of data flow is to determine its adaptability to large scale mechanical processing.

The next step is to examine the size of the data flow and relate it to the capacity of the machine proposed for installation. It must be determined at this point, of course, what parts of the data flow are subject to automatic data processing. These portions then must be in turn examined to determine the suitability of their size for use of large scale equipment.

Personnel

Along with any installation of automatic data processing comes the question of personnel problems. As has been the case throughout modern history, there has always been a concern as to what will happen to people when any type of mechanization or automation takes place. History has also indicated that society has been able to provide jobs for people and that with improvements the jobs are enlarged and tend to be better than they had been before the introduction of

additional capital equipment. Usually the matter of any possible loss of personnel can be handled by ordinary personnel turnover. The personnel problems that cannot be resolved in this way may possibly be handled by the shift of personnel to other jobs within the company. The opportunities available by either of these alternatives should be determined and evaluated.

An even more immediate personnel problem with respect to automatic data processing is the question of the types of personnel which will be needed to man the proposed system. The first step, of course, is to define the new jobs which will necessarily have to be filled. Then comes the question of determining whether or not people are available within the company to do these jobs. To the extent they are not, the question is what training can be given to provide the necessary personnel qualifications. Another aspect of study in this connection is to determine the degree of personnel resistance which there will be to change and what must be done to overcome it.

Cost of Installation

Obviously, the cost of installing an automatic data processing system means the incurrence of some additional high cost for machines and the employment of certain personnel at fairly high rates of pay. These additional costs will, of course, be compared with the reductions that may take place in other costs such as occur through space saving or the saving of clerical work. Frequently, such savings do not entirely offset the increases that occur in other costs for more skilled personnel and for the rental or other usage costs of equipment. In such a case it is necessary to determine whether or not the improvements in the system compensate for the increased costs. The types of improvement which must be counterbalanced against such increased costs would be more expeditious reporting, as well as the providing of additional or improved information.

The cost of new equipment often is compared with space saving in order to show its advantage. Sometimes this comparison of cost with space saving has a greater significance than just the bare monetary quantities which are indicated in comparing past space costs with the contemplated equipment cost. This may be true because of pressing needs for space such as may occur in a limited office building in a metropolis. It might mean that because of limitations of space, either reductions have to be effected such as by compressing the data processing function into smaller space by means of automatic equipment or that additional space must be provided. Such additional space provisions do not come necessarily in small graduated increments but, as we know, often occur in fairly large jumps. Thus, the space saving cost needs to be evaluated in terms of one incremental cost for space against the incremental cost for equipment minus the savings in present costs.

The question of equipment cost versus savings has a further quality of involving a surveying of the entire accounting system for savings that are possible. This system survey is a time consuming process and if carried out to any fine extent would result in considerable delay in arriving at decisions. Therefore, as was indicated by John S. White (*in the N.A.C.A. Bulletin for June, 1955, p. 1344*) the Esso Standard Oil Co. had the systems department make a rough estimate of possible savings. Such a rough estimate whether based on sampling techniques or other means may serve to give an indication of the direction which savings can be expected to go and certainly may give an over-all estimate of their magnitudes.

In situations where data processing is involved there always are potential costs of machine failure. The less specialized the equipment is and the more manual the operation tends to be, the less costly, ordinarily, is any possible failure in the system. However, if the system is highly mechanized and involves the use of highly specialized personnel and in turn involves the processing of extremely large quantities of information, then machine failure is indeed very costly. This is well attested to by the fact that many companies who introduce automatic data processing equipment continue to make parallel runs by older methods until they have tested out the equipment for such major causes of failure as machine breakdown or flaws in the system.

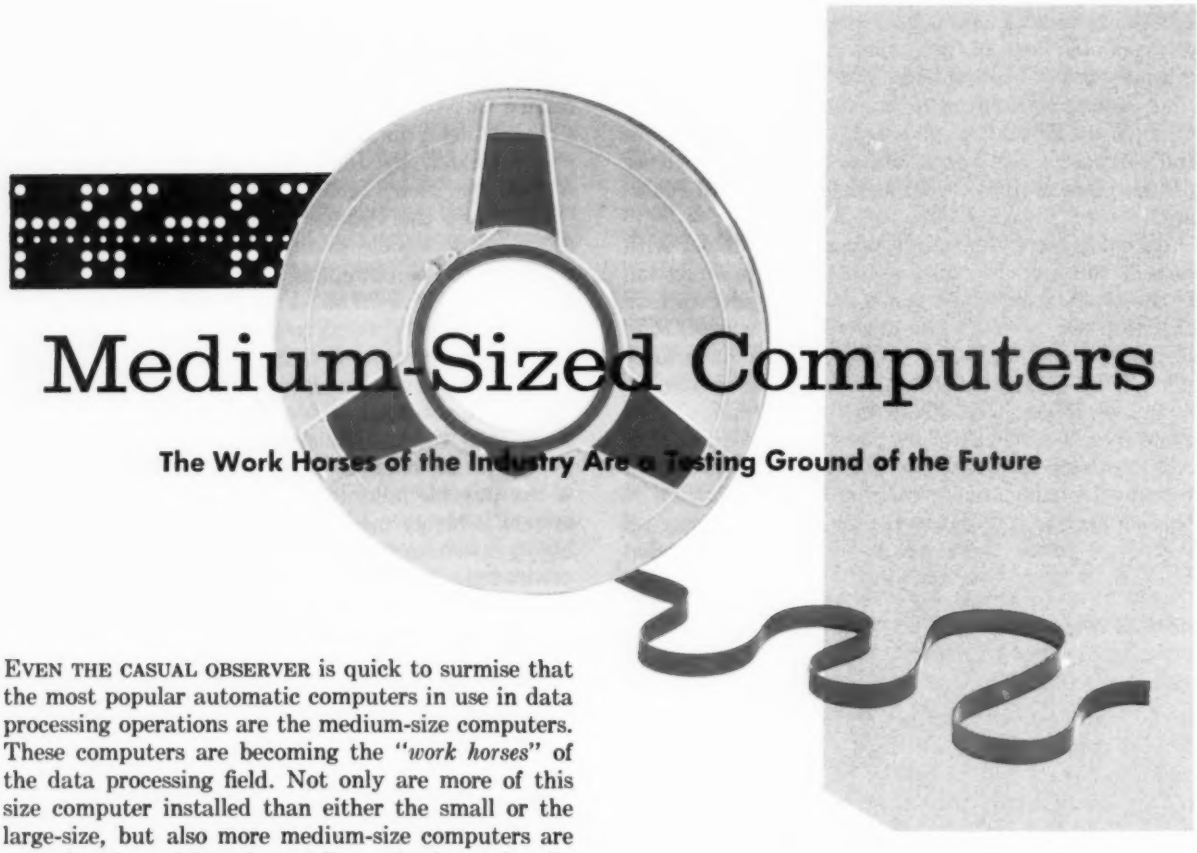
Sometimes the payout period is figured as a step in evaluation of projected equipment. Roughly, the expected payout period in years is the cost of the equipment divided by the expected annual savings. One limitation to this type of analysis is that one cannot quite visualize the factors that may assist in the paying out on the projected installation. One factor, for example, that has probably not been reckoned too well is the advantage in learning which takes place as new equipment is in process of development. Many companies figure that they have some advantage with respect to data processing because they have already been gaining a degree of experience by using automatic equipment even before its economy can be demonstrated.

Equipment Integration

Another phase of appraising the feasibility of installing automatic data processing is to determine how well it integrates with other equipment. The approach to this which has gained considerable attention has been the efforts of a company like the United States Steel Corporation in developing common language methods to enable integration of automatic data processing equipment with other equipment already in use, for which heavy investment has been made.

There still remains the question as to whether or not the system work can be accomplished in time for a projected installation. This is more a problem of the

(continued on page 36)



Medium-Sized Computers

The Work Horses of the Industry Are a Testing Ground of the Future

By Ned Chapin

EVEN THE CASUAL OBSERVER is quick to surmise that the most popular automatic computers in use in data processing operations are the medium-size computers. These computers are becoming the *"work horses"* of the data processing field. Not only are more of this size computer installed than either the small or the large-size, but also more medium-size computers are on order than either the small- or the large-size. In fact, both installed and on order quantities of medium-size computers have exceeded the combined totals for small-size and large-size computers.

Such a high degree of preference among automatic computer users for medium-size computers surely does not rest on trivial factors, but probably rests instead upon some very substantial considerations. Talking with the users of medium-size computers has revealed that, in practice, a large number of considerations have been viewed as significant in determining the selection of the computer. And each installation is different. But only about four or five considerations seem to have been of dominant importance. To see clearly the reason for the work-horse position of medium-size computers in data processing operations, a brief look at these dominant factors is helpful.

Cost

One of the most important factors that has contributed to the popularity of the medium-size computer has been cost. In terms of total cost, using a medium-size computer (*as would be expected*) involves less total outlay than the use of a large-size computer but requires a larger total outlay than the use of a small-size computer.

The medium-size computer is also in the middle on two things related to total cost. In the small-size computer, the capability to do data processing is smaller than, and the amount of physical hardware is

less than, for the medium-size computer. And for the large-size computer, the capability is larger and so is the amount of physical hardware. These factors make the just noted total cost pattern seem reasonable. Thus, a larger total cost seems expected in the case of the large-size computer with its large amounts of hardware and high degree of data processing capability.

A more meaningful way of looking at the cost picture is in terms of total cost *per unit* of data processing that can be accomplished. In terms of total cost per unit, it may be observed that the small-size computers are the most costly and that the large-size computers are the least expensive. Here again the medium-size computer fits in the middle. But some of the data available indicates that the medium-size computer is closer to the small-size computer in terms of per unit total cost than it is to the large-size computer.

These cost considerations suggest that for companies concerned about the amount of the total outlay, but less concerned about the per unit total costs, the small and medium-size computers have been much more attractive than the large ones.

Size of Job

A second very important factor that has contributed to the popularity of the medium-size computer has been the size of the data processing job. Because of the capability difference noted previously between the small, medium and large-size computers, and because of the large total money outlay necessary to put a computer to work, medium-size automatic computers have been most widely used in medium size to large-size companies. But typically they have not been used on the *total* data processing job of such companies, but only on *pieces* of the total job, such as payroll or customer billing. Typically, it has taken only a few of such piecemeal applications to fit closely the data processing capacity of the medium-size computer.

The closeness of the fit is in terms of the operating time required by the applications. Because of the capability of the computer to do data processing, to get a given job done requires a certain amount of time. But there are only so many hours per shift and only so many shifts per day. Taken together, a selection of several of the piecemeal applications considered for a medium-size computer has usually been found to require a combined processing time which closely matches company policy with regard to the hours and shifts a medium-size computer is expected to operate.

This is not to suggest that similar sizes of applications are non-existent in small companies. Far from it, but the total cost of using an automatic computer has very often ruled out small companies as users of medium-size computers.

For large and for non-piecemeal applications in medium to large companies, the medium-size computer has usually been too small to provide the *time capacity* required to meet their data processing needs. For these companies, large-size computers have been the answer. But for most medium- to large-size companies which have selected piecemeal applications, it has been found that the time capacity available from a medium-size computer fits well with company policy on the extent of the use of the automatic computer.

Popular Applications

A review of the applications in actual day-to-day production on medium-size computers shows a wide degree of variation; the title of "work horse" for the medium-size computer is being earned indeed. And the medium-size computer has been put to work in more than just a few major industries.

Companies scattered throughout nearly every major industry in the U.S.A. use medium-size computers for data processing. Industries represented most commonly have included (*not in order of importance*): chemicals, government, rubber, finance, communication, insurance, utility, transportation, wholesale trade, construction, electrical goods, food, ceramics, primary metals, metal fabricating, paper, petroleum, publishing, textiles, tobacco, drugs, machinery manufacture, lumber, education, etc. The most significant industries not having extensive representation have been the service industries. But these industries, it will be noted, have many firms of relatively small size.

Payroll has been by far the most frequent application put on medium-size computers in data processing work. The second most popular application has been sales analysis, often involving aspects of order writing, invoicing, billing and sometimes accounts receivable. Costs and expense accounting has been the third most popular application. Inventory status and inventory control generally rank fourth. Fifth among the applications in popularity has not been data processing at all, but has been engineering and technical calculations for the design and evaluation of products, production methods and raw materials as well as for the evaluation of product performance. Very often this work has been done on a shared basis with data processing operations.

Accounts receivable and billing applications have ranked as sixth in popularity. These have often involved the maintenance of historical files on customers. Production scheduling has been the seventh most popular application. General accounting has been eighth, and supplier or vendor accounting involving accounts payable has ranked ninth. Tenth among the applications has been stockholder accounting, primarily the maintenance of stockholder records for the processing of dividend distributions. Eleventh has been the use of medium-size computers for operations research and similar activities. In all, these eleven most popular applications have accounted for over 80% of the usage of medium-sized computers installed mostly for data processing operations.

Computer Popularity

A third important factor that has contributed to the popularity of the medium-size computer has been

its own popularity. It has been said that success breeds success, and this would appear to have been true for the medium-size computer. As greater numbers of medium-size computers have been installed, prospective users who have been hanging back have been increasingly able to say to themselves, *"Well, Smith uses one, Jones uses one, and now Brown is getting one; I guess it could work for me too."*

Also, prospective users can see medium-size computers in actual operation with much less difficulty than they can the large-size computers simply because the medium-size are more common. Also, prospective users are likely to be able to see applications being processed that are similar to the ones they are contemplating because of the wide variety of applications on which medium-size computers are working. Also, prospective users may talk with people they know who have medium-size computers installed. Because they know them, they can speak without fearing they are getting just another sales pitch.

Computer Attributes

A fourth factor that has contributed to the popularity of the medium-size computer has been the particular attributes of the medium-size computer. These have affected the way the medium-size computer has been fitted into the using companies. Thus, a medium-size computer occupies less floor space than does a large-size computer, although more than a small-size computer occupies. For a prospective user who can easily make only some accommodation to the existing floor space usage (*the usual case*), a large-size computer can entail much more inconvenience in installation than a medium-size computer.

More importantly, a medium-size computer, because it is capable of doing less than a large-size computer, usually has less impact upon the operation of the company in which it is installed than would a large-size computer. This lesser degree of impact makes it easier to fit the automatic computer into a company without disrupting operations, without changing established work routine, and without making substantial modifications in the existing information system of the company.

This lesser degree of impact has contributed importantly to the popularity of the medium-size computer. In medium-size companies installing a medium-size computer, the impact upon the information system of the company may be in relative terms nearly the same as the impact caused by a large-size computer in a large company. But for a large company installing a medium-size computer, the repercussions upon the information system and upon traditional work patterns may be so small they are like pouring a cupful of water into a river; a few ripples and that is all.

The supposed greater simplicity of programming for a medium-size computer and the brief and widely available programming courses, have contributed to the ease of hiring programmers with some training, and sometimes, even some experience. It has also made some companies less reluctant to have their own employees trained. Because the preparation of applications for medium-size computers (*as for any other size*) requires the services of programmers, the availability of programmers who do not have to be trained from scratch, and who in turn can help train company personnel, has been a matter of importance to prospective using companies.

Growth of Applications

The fifth factor that has contributed to the degree of popularity of the medium-size computer has been that the medium-size computer can represent a compromise where the size of the job, after allowing for growth, indicates that a large-size computer would fit best, but where the availability of funds or the willingness to change in the company are not enough to acquire a large-size computer. This compromise has usually been in terms of both cost and benefit received. In such installations, it is usually observed that the time capacity of the computer available to meet the needs of the applications is generally very tight—there is often little room for growth. Almost any growth in the size or number of applications seriously presses upon the time availability of the medium-sized computer used. In such forced-fit cases, which are not infrequent, the medium-size computers can be and have been very easily outgrown.

In these instances where growth has occurred, management has frequently not changed to a large-size computer, but has instead, acquired additional medium-size computers. These have been used primarily in three ways: *1.* By having the applications split into two or more parts, assigning each part to a computer; *2.* By running the two or more computers in a parallel fashion on the same applications; or *3,* By decentralizing the computer installations closer to the sources of the input data. In this latter case, for example, major divisions of a company may be provided medium-size computers to do applications which formerly were done centrally, or were not done at all, or done less satisfactorily in the central installation.

In Conclusion

The general picture of the medium-size computer used for data processing is one of balancing the costs of the use of a computer, not only in terms of money, but also in terms of time, physical facilities and impact upon existing information system, against the benefits to be gained by getting the data processing job done better. The jobs, in medium and large-size companies that have been put on the medium-size computer have typically been a non-integrated group of piecemeal individual applications. These just-mentioned factors operating in concert with other factors have apparently accounted for the popularity and the *"work horse"* status of the medium-size computer for doing data processing work in business.

■ ■ ■

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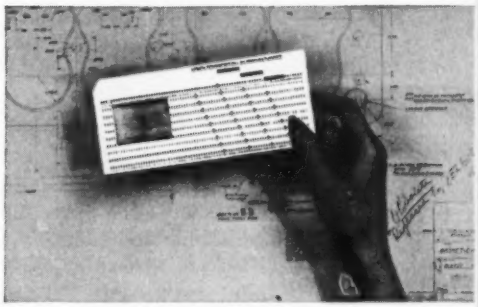

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Small Scale Computers

A Rapidly Expanding Concept. The Mighty Mites of Science—and Now Business

Definition

PERHAPS THE BEST CRITERION for assigning the term small scale to a particular computer is cost. The most expensive small scale computer may be purchased for slightly more than one month's rental of a typical large scale system. There are half a dozen different manufacturers in this area. All but one of them have products in the medium and large scale systems. The original entry for small scale computers was in 1955. Subsequently additional entries made their appearance. However, these small scale systems were marketed for engineering applications. It may be presumed that medium and large scale systems are partly responsible for the coming of the *"mites"*. The vast majority of medium and large scale computers are utilized for commercial applications of a repetitive nature. The time involved in programming and debugging these applications plus their utilization in running them prohibits their use for *"one-shot"* or non-repetitive applications. Unfortunately, most scientific problems are of the aforementioned type. A further obstacle is the amount of time involved for engineers, etc., to define a problem to a programmer who almost always has little or no background in this area. And the opposite end, that of training scientific personnel in the functions of programming and operating the computer, does not justify the results.

Designed for Science

When the first small scale computer entered the field in 1955 it was designed as a tool for scientific applications. It was not, however, a high powered desk calculator or glorified slide rule. This first entry as well as the others that followed were stored program machines, and thus true computers. True, their capacities, both arithmetic and storage, were not extensive for if they were they would then no longer be small scale.

The input to these small scale systems is usually via a console keyboard or paper tape, depending on the particular system. Output is by printer and/or punched paper tape and/or punched cards.

Furthermore, the computer manufacturers have constantly striven to speed up their products while simultaneously reducing space requirements. It seems transistors may well be the answer. They will do the work of a large scale system while occupying the space and power of a medium scale system. It is presumed that they may carry this one step further at least, i.e., increase the power (speed and memory) without a comparable increase in size and cost.

Computers have opened the door to problem solving never before dreamt of. They have also taken the drudgery out of their work—repetitive arithmetic operations. These systems give precise answers to problems, while doing a remarkable job of time compression. They solve a problem in a few minutes that normally required skilled personnel the better part of a day to accomplish.

This leads us into the definite but hard to gauge advantage of freeing scientific personnel for original, creative work instead of being occupied in wearisome repetitive operations. Also, the educated but extremely costly *"guestimate"* is becoming a thing of the past. With these new tools, science can measure precisely the quantity and quality of material to be used for maximum operation and safety yet do so at a minimum of cost.

I have been speaking of computers in general up to this point. But, there are limitations in large and medium scale systems which are obvious. It is the area of the small scale computer system in which I wish to concentrate.

By Mortimer J. Sullivan

Very often a company having a large or medium scale computing system must, because of cost, utilize this equipment constantly in order to have it earn its keep. Aside from daily, weekly, monthly, etc., commercial applications being processed, only those scientific problems are processed which can use the same program time and again, changing only the actual data. These problems are only a small part of the frontier of scientific problem solution. In order to accommodate the needs of various groups or departments in a company as regards access and utilization of a computer, schedules and priorities have been set up but these are relatively useless in the long run because of inherent time lapses between problem definition, programming the problem, debugging, and finally, actually running the problem. By this time the scientist is usually fed up with the entire project.

The answer came with the small computer. There are now well over 300 in use and many more on order. As was pointed out in the beginning they are relatively inexpensive yet powerful. Almost any one can learn how to effectively operate them in a day or less. It thus becomes entirely practical to supply one to each group or department and still maintain a medium or large scale system for overall company operations. One of the direct benefits attached to the small computer is that the individual or group immediately concerned with the problem are the people who run the problem. Going one step further, the results of one or a series of problems may be recorded via output equipment in such form *(punched paper tape or punched cards)* as to be easily read into a large or medium computer for final correlation under a standard or easily created program. Under this set-up, while a problem is being processed on a small computer, the scheduling for processing the output could be obtained. Also the program could be written and actual time on the large or medium computer made available so as to coincide with finalization on the small computer.

Benefits of a Small Scale Computer

The foregoing is but one area wherein a small computer offers much for very little cost. Very often a scientist desires to experiment, play around, if you will, with a small computer at his disposal. He may wish to process a specific problem several different ways. That is, he may decide to solve an algebraic equation but each time assigning a different value to the symbols *(letters)*. Along these same lines, there are problems which are based on the results of the previous answer. The answer cannot be validated until it is known. Now if the answer cannot be validated, the scientist must go back to the previous step and alter the problem or completely change his premise before continuing. Can you imagine any individual let alone a scientist tying up a large or medium system while he speculated or theorized? But should this relegate his problem to limbo or to the next best means available? It may in some organizations but there are many companies, especially in the aircraft industry, wherein his experiments or formulations are critical to the existence of the company. Companies of this latter type were among the first to see the real advantages, yes, opportunities, of small computers.

Installation

Interestingly enough, along with the relative inexpensiveness of purchasing a small computer, installation costs nothing, i.e., no special flooring, wiring, air conditioning, etc., which are so patently required with a large or medium scale computer. These units will occupy the floor space and work area of a normal desk and may be operated by plugging them into the nearest wall outlet—or any outlet for that matter.

Commercial Small Scale Computers

For the most part we have concentrated on the purely scientific utilization of small computers. There are now several models of business or commercially designed small computers available. Many have been installed and are performing extremely well. These types of small computers, designed for commercial applications, have the same advantages as outlined for small scale scientific computers. These small computers enable one individual or group to do a complete billing operation as well as provide pertinent output data in usable form *(punched paper tape or punched cards)*, i.e., for subsequent processing the original transaction in an accounts receivable or other automated routine. This is, of course, only one example. The number of possibilities is limited only by the user himself.

Very often a large corporate network, having decentralized as many operations as possible yet desiring to retain adequate control of its far flung operations at a minimal cost, utilizes such a small computer to facilitate customer service while being able to obtain records compatible with its centralized control operation.

The small business, with probably only one site, may utilize the small computer much the same way, except the output would be processed at a local service bureau. The small business computer opens the door to automation for the hitherto small businesses.

Summation

To summarize, there is much to be said for the small computer in both the scientific and business areas. The above is but a sketch, if you will, of the need and then utilization of a small computer. The following is a list of the current types of small computers available:

Bendix G-15
Burroughs, E 101
IBM, 610
IBM, 632
Monroe, Monrobot IX
Royal Precision, LGP—30
Underwood, EBC 100

■ ■ ■

IBM SHOWCASE

IBM HAS ANNOUNCED the formation of a traveling showcase. The tour started on March 2, 1959 and will wind up in early July. Actually it is five units, each one the same but covering different geographical regions.

It is featuring the low-cost data processing system, the IBM Series 50, also the 632 electronic typing calculator and the new IBM electric typewriter. This traveling business show will be announced in the newspapers of the cities concerned and the IBM managers in these cities will introduce and conduct the showcase. IBM explains that the Series 50 has been developed to put the advantages of punched card accounting to work for businesses which could not previously afford automated equipment. The economy line has exploded the myth that office automation is too expensive for the average size business.

The leasing costs for Series 50 installations range from $270 to approximately $665 a month. IBM representatives will demonstrate the equipment, handling billing, sales analysis, accounts payable and inventory control.

The cities to be visited by the five showcases this spring include:

Albany, Albuquerque, Aurora, Baltimore, Bethlehem, Birmingham, Boise, Bridgeport, Cedar Rapids, Charlotte, Chattanooga, Chicago, Columbia, Columbus, Concord, Dayton, Denver, Des Moines, El Paso, Flint, Fort Wayne, Garden City, Green Bay, Greensboro, Greenville, Harrisburg, Houston, Indianapolis, Jacksonville, Lansing, Louisville, Madison, Memphis, Miami, Mobile, Nashville, New Haven, Norfolk, Oklahoma City, Orlando, Paterson, Peoria, Phoenix, Portland, Providence, Queens, Raleigh, Riverside, Roanoke, Rochester, Rockford, Sacramento, Salt Lake City, San Antonio, San Diego, Schenectady, Shreveport, South Bend, Springfield, Toledo, Trenton, Tulsa, Utica, White Plains, Wichita, Winston-Salem, Worcester, Youngstown. ■

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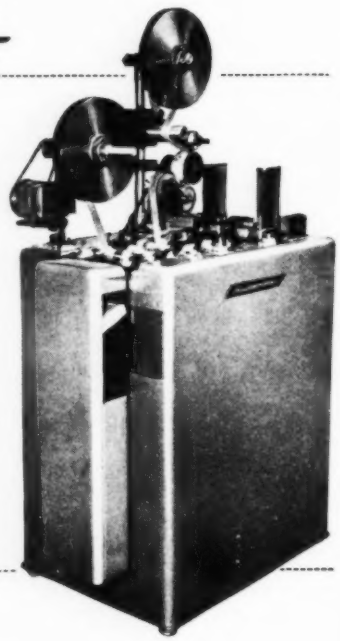

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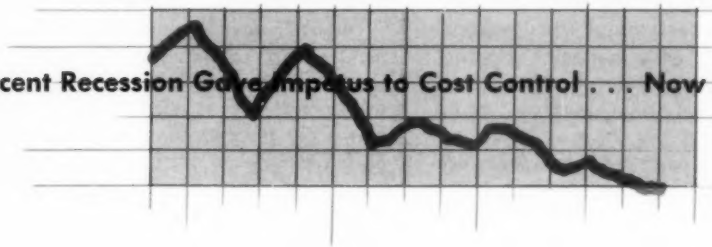
Significant Developments in Cost Control



The Recent Recession Gave Impetus to Cost Control . . . Now It's Here to Stay

THE SUBJECT OF COST CONTROL is today both timely and particularly pertinent for accountants, machine and otherwise. Management is coming to recognize more and more that the traditional record-keeping concept of accounting emphasizes an accounting function which is of relatively minor consequence. Of much greater significance is the dynamic contribution which accounting can and should make to planning and control of operations.

Before considering developments in specific cost control mechanisms, I should like to establish a premise which is basic to effective control. An essential preliminary to effective cost control is the establishment of sound over-all objectives, plans and policies, a pattern of organization designed to attain these objectives in an efficient manner, and the expression of the over-all plan in terms of financial and other control devices.

Basic Elements of Control of Costs

In a broad sense, the basic elements of effective planning and control of operations and costs are these:

- Planning begins with the definition of basic management objectives and policies, which in turn establish the general program of operations.
- Responsiblity for executing specific portions of the program is assigned to the various elements of the organization.
- Within the framework of the general program, each organizational element develops detailed operational plans. These plans are then expressed in terms of estimated operating cost.
- Reports of actual performance by areas of responsibility are provided promptly and in sufficient detail to permit analysis of variances between actual and planned performance and costs.
- Appropriate action is taken to correct the causes of variances, or to revise plans in the light of significant developments.

Developments in Control Devices

Now, let us consider developments in the specific control devices which may be brought into play. For the most part, the developments I'll discuss are refinements or extensions of control devices not in themselves new, along with a few which represent new concepts, at least in their application to business and industry.

The most widely used and probably the most important of these devices is, of course, budgetary control. Recent refinements in budgetary control systems fall into two general areas—the improvement of methods of forecasting income, and the use of performance standards in budgeting operating costs. Improvements in income forecasting have arisen largely through the application to business data of modern statistical and mathematical techniques, and developments in data processing machinery which now permit such techniques to be performed rapidly on great quantities of data.

An interesting example of this is the work being done by Arizona Public Service Company. Here, one

By Harold H. Schaff

of the industry's early large-scale computer installations will shortly be applied to revenue forecasting, and later to expense projection.

The plan contemplates preparation of a preliminary forecast based purely upon the mathematics of trend projection. Since this obviously will not provide for possible important changes in operating factors—acquisition of new territories, rate changes and the like—the preliminary forecasts will be reviewed and judgment adjustments established where indicated. These adjusting factors will be fed back to the computer which will then recast the affected portions of the forecasts.

In performing these operations, computer running time will be measured in hours, whereas using traditional methods the amount of time required would render the task impracticable.

The use of measured or engineered performance standards in budgeting costs is gaining wider acceptance in industry, because it offers a positive approach to cost control. In essense, these standards are based upon an accurate determination of what costs should be for a given level of operating activity, assuming an efficient degree of utilization of human and other resources. This is in sharp contrast with the too common practice of basing budgeted costs on last year's figures, on the prior period plus or minus a more or less arbitrary adjustment percentage, or on pure estimate.

The application of such standards to clerical work has generated much interest. In the utility accounting area, many companies have for some time collected production statistics for such repetitive, large volume activities as billing and meter reading. These statistics have been used in many cases to establish rough standards of performance based on prior average experience.

How to Realize Control of Costs

Obviously, regardless of how soundly a budget may be conceived, it will not result in cost improvement unless the cost objectives expressed therein are realized. The function of control is to bring about realization as nearly as practicable, of the planned costs.

Such control consists in continual comparison of actual performance with planned performance, analysis of causes of failure to achieve planned costs, and timely correction of the causes of such failures. Recent work has been directed toward sharpening the tools for evaluation of performance through variance analysis, and towards making possible more frequent, prompt, and properly directed signals of departure or tendency to depart from cost objectives in order to permit effective correction.

A sound system of cost performance reporting is, of course, essential to effective control. And, underlying the reporting system, there must be expense accounting procedures designed to provide cost data in the form required for budgetary and other control reporting purposes.

How to Supplement Primary Cost Control

In their effort to control costs, some organizations have supplemented their primary control effort in a number of ways. However, this supplementary effort is more properly classified as cost reduction, rather than cost control. Methods improvement activity, operations research programs and some of the other supplementary devices I'll discuss can, by their nature, be implemented without the specific control or savings goals produced by coherent management planning and formalized in a comprehensive budgetary control system. This is not to say that such devices are ineffectual or unimportant in themselves. Indeed, they can be an important factor in cost reduction and control, and they can make important contributions to the primary control mechanisms.

One such device is internal, formal methods improvement activity. Such activity usually assumes two forms. One form, that which has gained more acceptance in the utility industry, is office methods improvement. Today, only a few medium to large sized progressive companies do not include an office systems unit in the table of organization. The other aspect of formal methods activity is Industrial Engineering, long a tool of manufacturing industry.

A Look at Automation

The much-discussed concept of automation has some significant application to utilities, *for example,* in developments pointing to the possibility of automatic generating station and power system operation which promise to increase efficiency and further reduce production costs. This is a logical outgrowth of research which has already produced useful results in power system operation and load dispatching. Many of the companies represented here have already put electronic computers to work in this area for more economical power system operation. In the Northwest, even more complex interconnected systems of hydro and steam production have been aided in more efficient balancing of generating station operation by the methods of Operations Research.

This application of the methodology of science is also being used in the Operations Research area of management. Operations Research is perhaps best defined as a scientific approach to evaluation of alternatives under control of management. The procedures of Operations Research place greater emphasis on measurement of business factors, and the mathematical relationships among these factors. Its approach embraces the characteristics of objectivity, observation and measurement, reduction of the problem to a mathematical *"model,"* and conclusion testing. Its objective is effective management decision leading to improved scheduling, organization and control of operations.

Recent work on replacement and maintenance problems aims at establishing economic schedules for replacement and planned maintenance of transportation and other equipment. The problem consists of balancing the cost of new equipment against the loss of efficiency represented by old equipment and the cost of maintaining that efficiency. This again is a common problem in utilities in comparing the relative investment return on alternative uses of capital.

Inventory control is a topic of much Operations Research activity. *What is the economic inventory level? How much should be ordered? When should this order be placed?* The answers depend on use factors for the

inventory items, cost of ordering, lead time in obtaining items, economic lot sizes, cost of storing and the penalty costs of not having an item when it is needed. In recent years the problem of uncertain demand and optimal size of a reserve stock to protect against shortage has been studied.

Two other developments of recent years also merit consideration in the context of cost control. These are Electronics and the concept of Integrated Data Processing. While it is true that these somewhat related developments are not in themselves cost control mechanisms, their potential for contribution in that direction is considerable.

Is Automation the Answer?

It is true at present that a mild climate of disillusionment seems to exist regarding computers and office automation. However, this is probably a healthy reaction from the preceding atmosphere of almost unrestricted enthusiasm. No one now expects the advent of the fully automated, push-button office in anything like the immediate future. However, each month sees the application of additional medium and large scale computers to business data processing and the extension and refinement of the devices and techniques of office automation. In proper applications, these new tools have demonstrated their potential in two aspects of cost control.

One aspect of this potential is the prospect of holding down the cost of the data processing activity itself. In view of the present trend of such costs, this possibility is significant. I do not mean to imply that these devices and techniques will result in a major reversal of the trend of administrative-clerical costs. I do believe, however, that properly applied, they promise some containment—a slowing down of the relative rate of increase in the cost of paperwork.

Probably of even greater significance is the contribution which these new devices and techniques can make in the methodology of existing control mechanisms. What do these developments promise in this regard? More rapid communication and processing of data will greatly enhance the timeliness and thus the value of control reports. The high processing speed of the newer machinery will permit the processing of data in volumes not heretofore practicable, thus permitting an extension of the range of control reports. Greater flexibility will permit the performance of more complex mathematical routines upon business data to produce more accurate revenue forecasting, as well as other control information formerly not practicable to procure at all, or so long in preparation as to seriously impair its value.

These developments in electronic computers, in data transmission equipment, and in the device and techniques of office automation are worthy of continuing attention from the industry so that full advantage can be taken of their improvement and cost reduction potential.

Work Simplification and Cost Reduction Programs

Another form which supplementary cost reduction activities have taken in recent years is the use of such devices as Work Simplification Programs, and Cost Reduction Programs.

These devices have at least one point in common—all attempt to instill in the minds of supervisory and other employees an awareness of the need for cost reduction, and to stimulate them to develop and submit cost reduction ideas.

Work Simplification Programs have had some publicity in recent years. In this type of program, supervisory and other personnel are given a brief period of instruction in work simplification techniques. It is then expected (*hoped may be the better word*) that these techniques will be applied in each employee's work area. Meetings are scheduled periodically for "pep talks" and discussion of results to sustain interest in the program.

In the typical Cost Reduction Programs, all units of the organization are exhorted to examine their areas continuously for cost reduction possibilities and to report action in this regard at regular intervals. These reports are consolidated for review at succeedingly higher organization levels. Meetings are held at the highest level to review the over-all results. Such programs may run for a stated period, or they may be continued indefinitely.

A number of companies have evidently had some success with such programs, at least to the extent that they are encouraged to continue them. Used in conjunction with the more positive control devices already discussed they may be of some value as supplementary control devices in particular situations; but they are not substitutes for a comprehensive control program.

Wrap-Up

In summation, a positive, forceful cost control program begins with a definition of over-all management plans and objectives. This is supplemented by a critical examination of policy as it effects costs. Management's plans and goals are then given expression in concrete, financial terms in a comprehensive budgetary control system. The budgetary control system is the essential point of effective control in that it constitutes an integrated plan with defined performance goals.

New concepts and devices such as Operations Research, Electronic and Integrated Data Processing promise much toward making a sound budgetary control system an even more effective tool of cost control. The trend toward measured or engineered standards of performance is of some significance in budgeting expense levels.

Office methods improvement activity has gained wide acceptance in the industry as a device for cost reduction. The concepts and techniques of Industrial Engineering, not yet so widely accepted by the industry, offer substantial opportunity for operating improvement and cost reduction. Other recent developments in the field of supplementary cost reduction devices may be of value in efforts toward cost improvement.

Refinements in the more traditional control mechanisms, the application of new concepts and techniques to the art of management, and technological advances have made available greatly superior tools of cost control. It is now up to us to make effective use of these tools, to better translate management's plans into action.

■ ■ ■

Sampling Techniques in Accounting

A Do-It-Yourself for Accountants

SAMPLING in certain conditions is implicitly accepted in our daily living. If the first bite of your luncheon sandwich tastes poor you will send it back (*reject the whole*). If the taste is not poor, you will continue to eat it (*accept the whole*). This type of illustration can be continued into a good many daily habit actions that are so built into our living pattern that they need only unconscious recognition for acceptance.

There are, of course, those who have been introduced to statistical sampling at the academic level but have not been quite able to use this knowledge to pass over to the functional stage. Suggesting the use of statistics and sampling theory to the intellectual brings t! is typical rejoinder, *"Oh yes, I remember this at school, six points, but it really left no impression on me. I don't remember any of it"*.

Cultural Lag

It is realized that statistics, sampling, and the use of probability as a function of a number, may possibly be contrary to the years of ingrained training in school and business. We may also have developed a psychological antipathy to their acceptance because of lack of complete understanding and control of the topic and because of their primary use in the other sciences which normally do not come within the purview of the average accountant. Sociologists use the term *"cultural lag"* to describe the gap between a scientific advance and the adjustment by society to the implications of that advance. I would like to use this term to describe the gap between the progress in the accounting profession's use of statistics as compared to the other major sciences.

Rather than try to prove the use of statistics to you, which would require a course of study, could you be asked to adopt the principles based on their faith and simplicity? The faith we talk about is that the tables we are going to use were prepared by the U.S. Government Department of Defense, and probably function in their application anywhere in the range from space ships to food inspection with equal dexterity. We need this faith in our military even to exist today. We merely ask that you extend its range.

Define the Problem

The technique for using these tables requires absolutely no knowledge of statistics. It requires only that you be able to define your problem in terms of the tables and read out the coordinate points on a chart. Simple? Let's try it.

You are out to verify 3000 outstanding accounts receivables through direct communication with your clients' customers. It's a costly process now, consuming a lot of high cost manhours of clerical and accounting help, usually at the time of the year that they can least be spared.

We define this problem by saying we want this verification of accounts receivable to have a probability of being correct in its conclusion at least 95% of the time. Also, for each individual account the

By Ed Flamm

TABLE I

MIL-STD-105A		Sample Size Code Letters Inspection Levels*		
Lot Size**		I	II	III
41 to	65	C	E	G
66	110	D	F	H
111	180	E	G	I
181	300	F	H	J
301	500	G	I	K
501	800	H	J	L
801	1300	I	K	L
1301	3200	J	L	M
3201	8000	L	M	N
8001	22000	M	N	O

*This . . . "permits the user of the Department of Defense tables a choice between more or less discriminating samples" . . . Level III gives greater protection against making incorrect decisions than Level II, etc. Probability of making incorrect decisions:

Level I—33%
Level II— 5%
Level III— 1%

**The whole population. Use the range that takes in the number in the population.

amount verified must be at least 95% of the book amount to be deemed correct and therefore acceptable. This looks pretty good. We have a quantitative evaluation in the first probability, and a qualitative evaluation in the second.

Random Selection for Sample

We proceed to **Table I** and find that for a population of 3000 the total number of open accounts falls in the range 1301 to 3200. We defined the problem as requiring a 95% confidence level. At the co-ordinate point we find the letter "L". Moving to **Table II**, alongside the letter "L" we find the sample size required under random sampling to be 150. This means that we have to randomly select 150 open accounts, from the population of 3000, and evaluate them for agreement with the books and the verified statements. However, we must make certain that the individual accounts selected to comprise the sample be randomly selected. Random does not mean arbitrary. The method of insuring randomness is infinitely simple. We go to any book of four digit random number tables, starting at any point but proceeding sequentially, and select the first 150 numbers that have their counter-part in the account identifications. (A one shot operation is required before we apply the tables. Each open account in the population must have a four digit number randomly assigned to it for identification.) The 150 accounts so selected comprise the sample.

In the second condition we defined as acceptable validation for each individual account where the verified amount did not vary from the book amount by more than 5%. (Where the percentage of acceptable difference is not on the table, take the next higher.)

Running down the 6.5% line (*next higher than 5.%) on Table II*) to the horizontal line showing the sample size of 150, the co-ordinate point shows the two numbers 17 and 18. This tells us of the 150 accounts that were matched for book amount against the verified amounts, that if 17 or less were found to be incorrect as previously defined, the entire population of 3000 accounts was to be considered as valid. If 18 or more were found to be incorrect in the comparisons, the entire population of 3000 accounts must be 100% verified to track down the discrepancies. In the above example, one random number was used to represent one open accounts receivable. In verifying physical inventory against book records, each random number may represent an item classification where many units are in each class. Not only would the sampling technique save tremendous inventory validating man-hours, but it would permit the auditor to make an accurate statement as to its correctness and precision.

Remember that the Internal Revenue Department has been using sampling techniques on tax return examinations for years. ■

TABLE II

MIL-STD-105A Sample		Master Table for Normal Inspection—Single Sampling Acceptable Quality Levels*											
Code	Size	1.0		1.5		2.5		4.0		6.5		10.0	
		acc	rej	acc	rej	acc	rej	acc	rej	acc	rej	acc	rej
F	15	0	1	0	1	0	1	1	2	2	3	3	4
G	25	0	1	1	2	1	2	2	3	3	4	5	6
H	35	1	2	1	2	2	3	3	4	5	6	7	8
I	50	1	2	2	3	3	4	4	5	6	7	9	10
J	75	2	3	3	4	4	5	6	7	9	10	13	14
K	110	3	4	5	6	6	7	8	9	12	14	18	19
L	150	4	5	5	6	8	9	11	12	17	18	24	25
M	225	5	6	8	9	11	12	17	18	24	25	34	35
N	300	7	8	10	11	14	15	20	21	32	33	44	45
O	450	10	11	14	15	20	21	29	30	43	44	62	63

*Qualitative evaluation, percentage of acceptable differences.

acc—The whole is deemed acceptable if the number found to be defective is equal to or less than this amount.

rej—The whole is to be rejected if the number found to be defective is equal to or greater than this amount.

Organization and Administrative Facets of the Tabulating Department

A review of the general requirements and responsibilities of a data processing department. Along with some new ideas, an excellent refresher.

Primary Objective

THE PRIMARY OBJECTIVE of business management is to have profitable operations today and in the future. In business, management must face facts. When operating results are submitted with the optimum amount of detail, that compare and summarize with completeness and accuracy, management's decisions can be made on a sound basis. The efficiency of the tabulating systems used will reflect how well the facts are compiled, computed, recorded, and how accurate they are. Systems which are poorly planned will produce inadequate records, thus fail to supply facts which can be used for planning. Systems which are carefully designed insure completeness and accuracy. Another important factor is the speed with which this information is given to management. The faster reports are submitted, the faster management can make decisions based upon current operations.

In order to be certain that the best decisions are made when tabulating equipment is being considered, top management must be fully aware of the costs of installing tabulating equipment and they must decide whether they wish to rent or purchase the equipment. This decision will not be discussed here; needless to say, it is a very important one and the financial position of the company can be affected by the decision taken. Let us assume that management has studied the problem and is in agreement that the equipment is necessary. At this time the pressure is on the controller to organize, install, and perfect the system incorporating tabulating equipment. In most cases, the controller will appoint a committee to handle the details, but will keep abreast of all developments and will be responsible for all major decisions.

Consideration of Tabulating Equipment

The system is based upon top management requirements. They are not interested in how it is done, but they want it in the most efficient, most economical, and fastest manner possible. To do this, the controller must be certain of the applications or projects to be put on tabulating equipment and should secure the recommendations of an engineer from the manufacturer of the tabulating equipment to be used. It is also possible that the controller will contact a firm of management engineers who will analyze the problem and make their recommendations. This would give an independent and impartial view of the problem. Another source of information concerning the establishment of a system is to contact similar companies within the same industry to see if they have mechanized a similar system. We have received many visits from manufacturing concerns throughout the country in connection with our mechanized production control system, inventory control and cost records. We believe we have been of assistance to many people, who in turn, have given us many constructive comments which have helped to improve our methods.

Job Requirements

After the system has been established, one of the most important problems confronting the controller's committee in the establishment of a tabulating depart-

By H. B. Neander

ment is the identification of the job requirements. A few of these requirements are: **(1)** *editing documents for processing by the tabulating department,* **(2)** *key punching,* **(3)** *sorting cards,* **(4)** *collating cards,* **(5)** *interpreting cards,* **(6)** *filing — either by hand or mechanically,* **(7)** *wiring boards,* **(8)** *operating machines,* **(9)** *checking control points,* and **(10)** *scheduling the work.* The responsibilities of the personnel within the tabulating department must also be defined. This is done through the preparation of an organizational chart, showing the line of authority, the functions of each type of work and the number of people needed. If this is prepared in detail and is fully understood by all the personnel connected with the tabulating department, there will be teamwork and contentment from the beginning. If it is not, confusion and uncertainty will be a major problem.

Personnel

The first step in preparing the organization of the tabulating department is to select a supervisor with a background that includes accounting, tabulating and manufacturing *(if it is a manufacturing concern).* The best solution is to obtain this man from within the company, if possible. This calls for a special type of person because the supervisor must be familiar enough with all the phases to be able to contact the departments being serviced by the tabulating department and to be able to speak to them on equal terms. He must be a person who has the ability to get along with people and can show firmness in making the necessary arrangements to perform his duties. He must also help the recipient of his records to understand the reports. It is the supervisor who is the "key man" in the tabulating department and is liaison between all departments in the company. Success or failure of the tabulating equipment will depend largely upon him. The supervisor should be sent to the customer school of the tabulating equipment manufacturer so that he becomes thoroughly familiar with the operation of the equipment.

Training

The selection of operating personnel for the tabulating department should be made by the supervisor because he is responsible for their work. The key punch operators may be hired before the equipment is received and be sent to a service bureau or a neighboring plant to be instructed on the procedure of key punching.

The machine operators should be familiar with the equipment and should be capable of wiring or programming the machines. The categories of machine operator will vary with each tabulating department, depending upon the size and variety of equipment. There can be wirers — who wire boards for all machine operations, operators — who may run one type, or all types of equipment, trainees or beginners — who are learning how to operate and wire the equipment.

The second step is the training of personnel in the tabulating department, which must be carefully supervised. The key personnel can be sent to the training schools of the equipment manufacturers while the machines are still on order. There are splendid courses being offered, covering each piece of equipment manu-

(continued on next page)

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factured; thus basic knowledge will be available when needed. Beyond this, the training should be specific and can be offered by the company in the form of meetings to explain the particular projects to be applied to the equipment and the procedures to be used.

We held many meetings with the "key" tabulating personnel and the recipients of the documents, during which the complete projects were discussed and questions were asked of the personnel concerned as to what was needed, how often, and to what use it would be put. We found that we received many suggestions from the shop foremen which we incorporated in our reports and which have benefited us.

It is also suggested that the personnel who are not members of the tabulating department but who are concerned with the documents received be sent to administration school to enable them to understand the principles of the tabulating department — but not the technical details. This will eliminate requests for information which is of little value or requests for reports which are not good tabulating applications. There is a big difference between people in an organization all working together, and all of them just working at the same time.

Flow Charts

The preparation of flow charts for each project to be mechanized is the next problem. These must conform to the over-all system and are used to cover the functions of the tabulating department, but should cover the flow of work from the origin of the source documents through the completion of the action taken upon the reports or information distributed by the tabulating department.

One of the first steps we performed was to make a chart of the flow of paperwork from the receipt of the purchase order until equipment was shipped. This chart included the operations of the sales order department, engineering departments, production planning, production control, cost department, inventory control, timekeeping, purchasing, storeroom and general accounting. In addition to this, a step-by-step explanation of the flow chart was made and distributed to all departments. Each department was responsible for assisting in preparing the work of its particular department and for reviewing the completed chart. Conferences were held during which the complete procedures were explained, department by department, showing the results of the work each department had contributed toward the total operation of the company. In addition, each department understood why the work was being done and what use was made of its paperwork after it had left the department.

In addition to this, a pamphlet was prepared which explained the functions of the tabulating department and illustrated the various reports which would be submitted to each of the departments. At this point, a survey was made to determine if there was any duplication of reports or work to be done. Samples of the source documents and reports were prepared and submitted to the departments concerned, where they were examined to determine the final form to be used which would allow the tabulating department to process the documents rapidly and the recipient to understand the reports, easily.

In the beginning we received a great deal of opposition from the purchasing agent because he was concerned that we might be relieving him of some of his responsibilities. Since the tabulating department was preparing all the records for him, he felt that his department was becoming strictly a clerical department. In fact, he refused to use the reports for a short time. We held meetings with the purchasing agent and management and outlined our program in such a manner with flow charts as to convince him that we were indeed not relieving him of any responsibility, but we were in fact making him a true purchasing agent because he had to take action from the reports and did not have to prepare the reports. It was his decision to accept or reject the suggestions given to him by the inventory control department. He did not have to spend his time determining the suppliers for each item to be ordered, but could devote his time to selecting the best supplier under current conditions. At the present time, if the tabulating department is one-half hour late in submitting its reports to the purchasing department, we are made aware of this by the purchasing agent. This is a complete change from his original attitude and he has now become the staunchest supporter of the tabulating department because he has found that his department can operate much faster and more efficiently.

Card and Report Form Designs

As a natural result of the flow charts, the design of card and report forms should be completed. The card form must be carefully made to set up proper control fields to obtain the necessary reports. The supervisor will be best equipped for this work. The cards are the most important single item in the tabulating department because it is by means of the cards that all the reports are produced and the necessary information given to the people concerned. In allocating the costs of labor and material to a particular shop order, the cards must be so designed as to reserve a certain section of the card for the shop order number. For example, if the labor card has one through ten reserved for the shop order number, the material card must also have one through ten for the shop order number. In this way, the cards can be sorted or collated by the shop order number and a report made of these cards to obtain the costs of labor and material for each shop order. The report forms must be clear and simple enough to enable the people concerned to make sound decisions based upon the information shown. These forms are prepared with the help of the people who use them. The form designs should not be made firm — by this I mean they should not be custom forms for which there is a *"platecharge"* — they should be imprinted in the beginning to enable changes to be made during the initial stages of the system. We have found that some of the forms we designed were changed completely after they had been used for a short while. These forms should be revised and finalized within a few months.

Scheduling of Work Through the Tabulating Department

The administrative responsibilities of the tabulating department are equally important. Based upon the in-

formation needed by the departments being served, the controller's committee sees that the supervisor schedules the work through the tabulating department. This is particularly important when there are many applications on the equipment and the timing of the reports released to the various departments is critical. After the initial projects are operating smoothly, only one application should be added to tabulating at a time. After the first additional project has been installed and is operating satisfactorily, the next project can be installed. The time schedule for adding projects to tabulating equipment should be carefully "set-up" in order to avoid "bottlenecks." Each department contributing to the application must be informed of its responsibilities and the "deadlines" which it must meet in submitting documents for processing through the tabulating department.

Control points are very important in the administration of the tabulating department. This is the only means by which the accuracy of the system is controlled. Through this point alone, the government will accept or reject the system for use in cost plus fixed fee contracts. The Internal Revenue Department is also interested in the control points for the purpose of determining acceptability of the income tax reports based on tabulating system figures; there must be control points to prove the accuracy of the work completed to date. These can be established by the tabulating department with the totals of the reports prepared on the accounting machines. These should be part of the accounting entries from different sources. For example the posting of the accounts payable liability should balance with the tabulating report covering the distribution and supplier payment reports.

Job Procedures

Job procedures are of vital importance to all the personnel in the tabulating department. They must be simple and clear enough to permit new personnel to be on a productive basis in a minimum period of time. These procedures should be "tied-in" with the flow chart of the work performed by the tabulating department and should be scheduled. In our job procedures, we list first the subject of the procedure; second, the purpose of the work to be performed in this procedure; third, we explain the procedure in detail with illustrations and in language easily understood by the person who is to do the work; fourth, we list the disposition of the documents after the work has been completed. These procedures are grouped by various sections of each department and are indexed for easy reference. The master copies of the procedure are kept by the controller's committee and reproductions are made of these for each of the departments and sections within the departments.

Timekeeping

In order to control the costs of the tabulating department, it is necessary to install a method of timekeeping for its personnel. The departments served should be charged for the time spent in preparing reports or processing documents. This cost can be compared with the cost of the previous system to determine how much savings have been realized. In some cases the cost savings will be hidden because the work performed will affect more than one department and may involve additional tabulating personnel.

It is one thing to organize the tabulating department, and another to administer it properly. I believe that most concerns which have installed tabulating equipment and have used proper procedures have found that the tendency is to increase the applications on tabulating because of the flexibility and reuse of the same cards or tapes to obtain many reports. It has been found in many cases that the tabulating department has become "choked-up" with projects, with the result that the prime applications have suffered because of the additions of unnecessary ones. By unnecessary, I mean applications which do not show a reduction in cost, but are merely used for the benefit of certain departments and could be obtained by other methods.

Review of Projects and Procedures

Proper administration of the tabulating department means a review of the systems and procedures periodically to determine if they can be simplified, combined with other procedures, or eliminated.

It has been often said that the company whose system and job procedures do not change over a period of years has become lax. Furthermore, if the system and job procedures have not been changed in two or three years, they should be thrown out.

We make it a practice to review our job procedures in the fall of each year. Each procedure is first reviewed by the person doing the work. It is his responsibility to make any comments concerning the changes between the written procedure and the manner in which the work is being performed at the present time. Next, the job procedure and the comments are given to the supervisor to review with the person making the comments. If the comments constitute a change in the procedure, they are so noted and approved by the supervisor. These changes must be constructive and must show an improvement over the original procedure. After this, the procedure and comments are reviewed by the controller's committee with the supervisor, and if they are in agreement, the procedure is changed. In this manner, a review has been made by all persons concerned and it enables the supervisor and management to refamiliarize themselves with the job procedures. It may take a number of months before all the procedures have been reviewed—but we have found that we were able to make *"short-cuts"* and improvements each year through this method. Projects which were important last year may not be useful at the present time.

Questions

The following questions may be asked of the supervisor:

1. What would happen if the work group were cut by one person?

A good supervisor will immediately review the performance of his people using a more critical "eye." In doing this, he may get some ideas for rescheduling the work, eliminating non-essential jobs and giving more responsibility to promising people. If the group is overstaffed, this question is likely to bring out the

fact. Be certain that you make it clear your objective is not to lay-off people, but to justify their job functions.

2. How much more work could be turned out with new or additional equipment?

Through their reading in trade journals and their other contacts, the operating personnel may have more up-to-date information concerning new equipment and developments than top management.

3. Are all steps in the operation really necessary?

This question takes on real force when you add "why." How can it be simplified? Can any parts be combined?

4. How long has the job been done the same way?

As was stated before, if the method hasn't been changed in some respect during the past year, something is usually wrong with the operation.

5. If the supervisor had to take a 25% cut in his expense budget allowance, what expenditures would he eliminate or reduce?

This is a good thought question for uncovering waste in operating supplies, services, etc.

LONG TERM, SHORT TERM PROJECTS AND THEIR IMMEDIATE PROBLEMS TO BE SOLVED BY THE CONTROLLER'S STAFF:

First of all, we must have an understanding of what is meant by projects. Projects are applications for the tabulating department which must be researched and studied prior to adopting them as part of the system and procedures. Each new project should be analyzed as to the long term, short term and immediate problems they will cause if they are included with the present system and on the present tabulating equipment.

Scheduling or Subcontract

Any project must be first analyzed by asking the question: Is it worth studying? Are potential savings enough to warrant the cost of the study?

Assuming that the project meets these tests, questions should be asked of the present method of handling the project. Who is doing it and why does he do it? What is done and why is it done? Then, how is it done and why was it done that way? And last, when is it done and how often?

The following questions should be asked concerning the adoption of the systems to tabulating equipment:

How will this project fit into the present schedule?

Will additional equipment be necessary because of this project and if so will the savings over the previous method warrant the investment of new equipment?

Will additional personnel be needed to do this work on tabulating equipment and if so, what type of personnel will be needed and what are the costs?

Can this information be secured from the combination of documents already being processed by the tabulating equipment with minor changes?

Will the information received from the tabulating department be accurate enough and fast enough to allow the recipient of the reports to make the decisions and take action upon receipt of the information without going into lengthy studies and discussions of the report?

The short term projects should be analyzed further to ascertain whether they can be given to a service bureau or be performed outside of normal scheduled hours.

It must be remembered that some short term projects are of vital importance at the time and could possibly take precedence over the regularly scheduled work being performed by the tabulating department. At such times, they should be definitely "set-up" as separate operations and performed at other than the normal scheduled time or performed by a service bureau.

In regard to the long term projects, care must be given to the inclusion of these projects at a time when the volume is lower than normal because this additional work in the tabulating department could become a *"bottle-neck"* as soon as the volume increases. A study should be made to see the effect on low volume, normal volume and high volume periods. Any additional equipment or personnel necessary because of the inclusion of a long term project should be taken into consideration and the necessary action taken when the need becomes apparent. If the long term project is not a recurring one, thought should be given to have it done outside normal scheduled time.

The personnel involved must be thoroughly familiar with the problems and must be able to schedule the time the projects will take. This must be in the form of operating hours, and in the arrival and departure of the documents in the tabulating department. A flow chart must be made of the entire project including the tabulating department functions and all of the clerical operations. This flow chart must be discussed with the departments concerned and scheduled as to the release of documents by all departments to meet the scheduled delivery time to the person requesting the information. Forms must be drawn and examined by the personnel involved to determine if the information shown on the forms will enable the decisions or actions to be taken.

Rush Items

One of the most plaguing problems to be found in the administration of the tabulating department will be the problem of "rush-items"; i.e., items which must be processed immediately through the tabulating department in order to enable action to be taken.

We find that our production control system — which is tightly scheduled — creates a problem, due to the necessity of preparing new routing folders outside the scheduled time to enable the shop to manufacture or modify an item urgently needed for the completion of a piece of equipment. These "rush-items" are handled by writing the information and releasing the routings to the shop without going through the mechanics of preparing documents in the tabulating department. Upon completion, these items are processed through the tabulating equipment. There must be established a method to allow these "rush-items" to be processed without any delay, even an hour or less may be critical, and to record the information after the fact.

Conclusions

Based upon my experience, I feel that the most important facets of the organization and administration of a tabulating department are:

1. Establish the system to be used, based upon management requirements.

2. Identify job requirements and establish an organization chart.
3. Find a good supervisor.
4. Select operating personnel.
5. Establish a good training program for all "key" personnel—both in and out of the tabulating department.
6. Prepare flow charts of all projects.
7. Use information techniques to inform the rest of the company that the tabulating department is not trying to "take-over" all functions, but is trying to help them do a better job with less effort and save them from doing detail work.
8. Design and report forms to enable the reuse of cards and forms on different projects by establishing the same control fields.
9. Establish detailed job procedures for all personnel.
10. Set-up a system of timekeeping and notify the various departments of the cost to service them and if possible give them a comparison with the previous cost.
11. Review the systems and procedures periodically. Business today must be aggressive and accept new ideas to meet the market challenge. The tabulating department must also be certain it is using the best systems and the optimum equipment to enable the department to survive and prosper through better reports at a lower cost. ■

APRIL FOOL OR GENIUS

"How To Be Efficient With Fewer Violins"

METHODS ENGINEERING and procedural improvements in operations are reasonably well accepted activities. A wonderful example of how well this work is accepted is shown by the following application of creative imagination.

After a visit to a symphony concert at the Royal Festival Hall in London, a Work Study Engineer reported:

"For considerable periods the four oboe players had nothing to do. The number should be reduced and the work spread more evenly over the whole of the concert, thus eliminating peaks of activity.

"All the twelve violins were playing identical notes; this seems unnecessary duplication. The staff of this section should be drastically cut. If a larger volume of sound is required, it could be obtained by means of electronic apparatus.

"Much effort was absorbed in the playing of demi-semi-quavers; this seems to be an unnecessary refinement. It is recommended that all notes should be rounded up to the nearest semi-quaver. If this were done it would be possible to use trainees and lower-grade operatives more extensively.

"There seems to be too much repetition of some musical passages. Scores should be drastically pruned. No useful purpose is served by repeating on the horns a passage which has already been handled by the strings. It is estimated that if all redundant passages were eliminated the whole concert time of two hours could be reduced to twenty minutes and there would be no need for an interval.

"The conductor agrees generally with these recommendations, but expresses the opinion that there might be some falling off in box-office receipts. In that unlikely event, it should be possible to close sections of the auditorium entirely, with a consequential saving on overhead expense, lighting, attendance, etc. If the worse came to the worst, the whole thing could be abandoned and the public could go to the Albert Hall instead.

"Following the principle that 'There is always a better method,' it is felt that further review might still yield additional benefits. For example, it is considered that there is still wide scope for application of the 'Questioning Attitude' to many of the methods of operation, as they are in many cases traditional, and have not been changed for several centuries. In the circumstances it is remarkable that Methods Engineering principles have been adhered to as well as they have. For example, it was noted that the pianist was not only carrying out most of his work by two-handed operation, but was also using both feet for pedal operations. Nevertheless, there were excessive reaches for some notes on the piano and it is probable that redesign of the keyboard to bring all notes within the normal working area would be of advantage to this operator. In many cases the operators were using one hand for holding the instrument, whereas the use of a fixture would have rendered the idle hand available for other work.

"It was noted that excessive effort was being used occasionally by the players of wind instruments, whereas one air compressor could supply adequate air for all instruments under more accurately controlled conditions.

"Obsolescence of equipment is another matter into which it is suggested further investigation could be made, as it was reputed in the program that the leading violinist's instrument was already several hundred years old. If normal depreciation schedules had been applied the value of this instrument should have been reduced to zero and it is probable that purchase of more modern equipment could have been considered."

Author Unknown

Reprinted from Harper's Magazine.

Feasibility Studies *(continued from page 17)*

feasibility of installing on a given date than the desirability of the installation itself. Let us assume that executive approval has been given to the installation of automatic data processing equipment. After such approval we need to consider what must be done to get ready to install. Then we must appraise the desirability of the projected date of installation.

As is pointed out by T. V. Learson (*in the N.A.C.A. BULLETIN of July, 1956, pp. 1313-1314*) feasibility studies must consider improved methods of operation. It is not sufficient in most instances to consider the feasibility of merely continuing with the type of data processing which is already in effect in the company.

Immediate vs. Gradual Conversion

Another question concerning the feasibility of installation of equipment is whether or not conversion shall be gradual or immediate. Frequently, it is found that a gradual conversion is much more feasible than is an overall immediate conversion. Thus, conversion might first start out with payroll data and might next, for example, go to inventory control, and then gradually work into other phases of data processing. In one company data processing happens to be used for the solution of special problems only and an IBM 704 is used to make various special analyses that management needs from time to time.

There is, of course, the question of selling management on a computer and in many cases it is not possible to show that immediate dollar savings are available. Many companies have found that the off-hand estimates indicate such a projected installation might even result in added expense. A number of such companies have raised the question of whether or not it is possible to wait too long for the installation of equipment and therefore to get behind in knowledge of the use of such equipment since competition and new developments make it increasingly desirable to own and operate such equipment. ■

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THE AUTHORS

(continued from page 3)

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H. B. NEANDER (*"Organization and Administrative Facets of the Tabulating Department"*) joined Sciaky Bros., Inc. of Chicago in 1941 as a bookkeeper and has been their Chief Accountant since 1944. He installed the majority of systems of control now in use and supervises the functions of the cost department tabulating, timekeeping, inventory control and government accounting division. Mr. Neander attended American Institute of Banking, majored in business at Loyola, Northwestern and Valparaiso Universities and has taken IBM courses in Endicott, N. Y. and Chicago.

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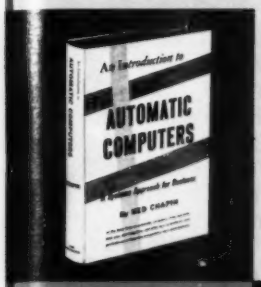

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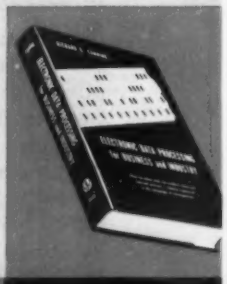

AN INTRODUCTION TO AUTOMATIC COMPUTERS, Ned Chapin, 544 pages, $6.75.

This noted authority fully answers the specific questions that are most important to business students. What is an automatic computer? What can it do? How does it function? How is it programmed and operated? How can the need for a computer be pinpointed and its use justified?

INFORMATION PROCESSING EQUIPMENT, M. P. Doss, 280 pages, $8.75.

Covers latest developments in such media as electronic and automatic typewriters, calculating machines, stencil and hectographing equipment, collating machines, lens-less copying with sensitized paper, microcopying, punched cards, machines for handling numerical data, and many others.

THE OFFICE IN TRANSITION, Esther R. Becker and Eugene F. Murphy, 190 pages, $4.00.

Based on the experiences of offices in which the transition to automation has been successful, this volume describes the human and technical problems that arise. Particular attention is given to the sociological aspects inherent with the introduction of automatic office techniques.

DIGITAL COMPUTER PROGRAMMING, D. D. McCracken, 253 pages, $7.75.

This new book accomplishes two important tasks for users and potential users of computers. It discusses the practical aspects in working with these machines and secondly, it gives a lucid picture of the fundamentals upon which this fast-growing field is built. A key feature is the mythical computer called TYDAC, devised by the author to illustrate principles and techniques.

INSTALLING DATA PROCESSING SYSTEMS, Richard G. Canning, 193 pages, $6.00.

This book takes a realistic approach in non-technical language. The author assumes the reader is relatively unacquainted with electronic computers and mathematics. It shows the wide variety of problems that can arise when installing an EDP system. It makes a special point of fitting EDP into overall management improvement.

INTRODUCTION TO OPERATIONS RESEARCH, Churchman, Ackoff, and Arnoff, 664 pages, $12.00.

This is the only available introductory text on Operations Research. It emphasizes the method of approaching research from a scientific viewpoint and stresses the importance of defining management problems in terms of objectives and of administration of O.R. Contains numerous lucid case examples.

COMPUTERS, THEIR OPERATION AND APPLICATION, Berkeley and Wainwright, 376 pages, $8.00.

Down to earth information on exactly how computers work and what they can do, including such important considerations as computer reliability, advantages, limitations and maintenance.

ELECTRONIC DATA PROCESSING FOR BUSINESS AND INDUSTRY, R. G. Canning, 322 pages, $7.00.

Answers the major questions in management's mind about the field of electronic data processing by discussing the application of digital data processing devices to business clerical functions. The reader does not need any previous knowledge in this field for the author writes for the layman. The company is studied as a united operation which works toward a goal set by management.

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PRODUCTS & SERVICES

CHECK HANDLING WITH CONFORMING BANK MACHINES

Four new National Cash Register bank machines conform with the American Bankers Association common machine language. The NCR equipment, components of the company's automation line, has been designed to work with the ABA's "E-13-B" printed character shape. The four machines are Magnetic Character Sorter, Magnetic Amount Printer, Magnetic Qualification Printer and Automatic Ledger Feeder.

Magnetic Character Sorter

The machine sorts intermixed media at the rate of 750 items per minute, regardless of varying lengths, widths and thicknesses.

The items to be sorted are placed on the sorter loading platform. Additional items may be added to the first group placed on the loading platform without stopping the machine.

Twelve compartments for storing the sorted items are provided: one for each digit, zero through 9; one for uncoded or rejected items; and one for those items which need no further sorting.

Each stacker can hold 1200-1500 items. Items may be removed from a stacker during a sorting run without stopping or disturbing the sorter. Should a stacker be filled to capacity without the operator's knowledge, a limit switch causes the sorter to stop; a light signals which bin is filled.

An anti-jam mechanism is an important feature of the sorter. If any item being sorted is of improper size or is so mutilated as to interfere with the normal flow of the items traveling to their compartments, the anti-jam mechanism causes the item transporting unit to open immediately and the flow of items to stop.

Magnetic Amount Printer

The Magnetic Amount Printer is specifically designed for imprinting amounts on checks, deposits and other media, as the items are being proved.

Imprinting amounts on media as a by-product of the proof procedure eliminates any need for rehandling the items to obtain magnetic impressions, and it does not cause delay or interference with the normal proof operation.

Alignment of the item for printing in the area specified by the ABA is automatic. The Magnetic Printer can print ten digits of amounts, beginning and ending symbols, and an automatic numeric or transaction code to the left of the amount.

The Magnetic Amount Printer can be used with National Class 2000 Proof Machines in use today, with slight modification of the proof machine.

Magnetic Qualification Printer

The Magnetic Qualification Printer is designed to print the account number or the transaction number on checks and deposits in the New Account Department at the time the account is opened.

Exact form alignment is assured by a protective mechanism which disables the operation of the machine in the event the printer is tripped by a form improperly aligned.

Automatic Ledger Feeder

The Automatic Ledger Feeder may be attached to any Post-Tronic now in use to automate trial balances and balance transfers.

To take an automatic trial balance, the Automatic Ledger Feeder is attached to the Post-Tronic, and the statement-ledger forms are placed on the feeder loading platform. When the "Automatic Feed" switch is depressed, each card is individually, consecutively and automatically fed into the Post-Tronic, which reads the balance, prints the amount on the journal and returns the record to the feeder.

Transferring of balances is accomplished by intersorting the old and new statement-ledger forms, placing them on the loading platform of the feeder and depressing a switch. The Post-Tronic automatically reads the balance and account number from the old form, prints and magnetically encodes the same information on the new form, and returns the old and new forms to the feeder, which automatically stores the forms in separate compartments.

Some 3,500 Post-Tronic machines are now in use in approximately 850 banks. Subsequent steps in the National automation program are compatible with the ABA's "E-13-B" printed character shape for the magnetic character common language.

Further information available from Product Information, The National Cash Register Company, Dayton 9, Ohio. ■

THE IBM 7090 DATA PROCESSING SYSTEM

The fully-transistorized IBM 7090 is the most powerful data processing system to be marketed commercially by IBM.

The new electronic system has computing speeds up to five times faster than those of its predecessor, the IBM 709. This increase in performance is made possible by the use of thousands of ultra-fast transistors within the central processing unit of the computer.

Manufacture of the IBM 7090 is now under way at the Data Processing Division's Poughkeepsie, N. Y. plant. Delivery of the first system is scheduled for November to Sylvania Electric Products, Inc., Needham,

Mass., where it will be applied to a classified defense project. A typical 7090 will sell for $2,880,000 or rent for $64,000 a month.

Among the scientific applications for which the 7090 is suited are the design of missiles, rockets, jet engines, supersonic aircraft and nuclear reactors. In addition, the system will be able to handle such commercial applications as inventory control, production control, payrolls and general accounting.

General-purpose programs *(sets of instructions)* developed for the IBM 709 will be usable on the 7090 as will hundreds of programs developed for the IBM 704 computer. The means of input and output *(entering problems and receiving solutions)* will be compatible with all present-day IBM systems. Personnel familiar with the 709 should require a minimum of retraining to gain a technical knowledge of the 7090, according to the company.

The ability to read, write and compute simultaneously is provided by the system's new Data Multiplexor. Up to eight input-output data channels can be handled by the Multiplier. Each channel may have a total of ten magnetic tape units, a card reader, a card punch and a printer. A maximum 7090 system could include 80 magnetic tape units, eight card readers, eight printers and eight card punches.

IBM began its use of transistors in the computer field in 1955 when it introduced the 608 Transistor Calculator. In September of 1958 it introduced the IBM 7070, its first completely transistorized data processing system. ■

AUTOMATED BANKING EQUIPMENT

The new bank automation product line, IBM Series 1200 Character Sensing Equipment, is compatible with standard IBM data processing systems — to provide a full range of electronic paper check-handling systems for banks of various sizes.

The new equipment consists of four units: a proof-inscriber, a sorter-reader, utility inscriber and a control unit.

The key to the new paper-handling equipment is the use of a "common language" in the form of arabic characters, printed in magnetic ink on each check, which can be read by both men and machines and which meets the specifications of the American Banking Association.

Checks, preprinted before issue with routing, transit and account numbers, arrive first at the proof-inscriber unit of the system. Here the dollar amount and control information are printed in magnetic ink. Simultaneously the proof-inscriber provides individual listings and totals on tape of all transactions, accumulates totals for proving balances, prints endorsements, and establishes control totals.

The transistorized sorter-reader next sorts the checks, which may be of varying sizes, into the desired sequence. It also reads magnetic ink data from the checks for entering into the standard IBM data processing system with which it is being used. This could be a 407 accounting machine, a 650 computer, or a 705 or 7070 system depending on the size of the bank. In each case a transistorized control unit interconnects the sorter-reader with the standard system.

A utility inscriber is used to inscribe any necessary substitute documents with magnetic ink for processing through the banking equipment.

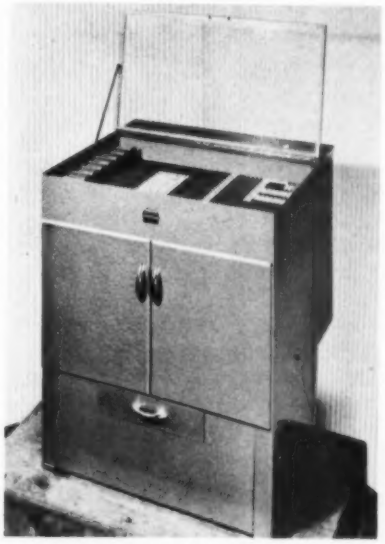
■

LOW-COST PUNCHED CARD SYSTEM

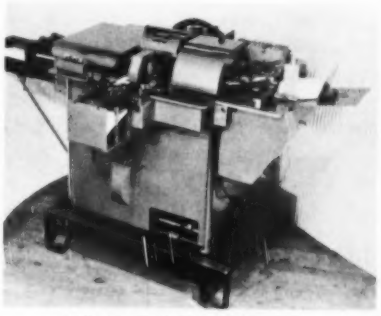
Remington Rand has announced a low-cost system of punched card data processing specially designed for small business. The new system consists of four basic pieces of equipment —the alphabetical punch, sorter, alphabetical tabulator and summary punch, and reproducing punch. It operates at a speed of 60 cards-per-minute. Additional units can be added as desired. Cost of the specially-engineered equipment is said to be below comparable manual systems. Remington Rand, 315 Fourth Ave., New York 10, N.Y. ■

PUNCHED CARD STENCIL ADDRESSING SYSTEM

This new system brings new flexibility by offering single-stroke, selective printing of names and addresses directly onto postcards, envelopes, or broadsides, etc., while retaining all features of the punched card itself. The punched card stencil consists of a standard punched card with a centralized window covered by a coated tissue type-writable stencil center, which, when stencilled, carries a guarantee of at least 10,000 impressions. Stencils are prepared on standard typewriters. Elliott Addressing Machine Co., Cambridge 39, Mass. ■



Control Unit for Model G-PCA and G-PCB Addressers



Model G-PCA Addresser

DATA PUNCH

The Victor Data Punch consists of a Victor full-keyboard adding machine which activates a tape punch. The punch operates at a rate of 20 digits per second on power supplied by the adding machine. Two records are produced simultaneously: a detail strip for immediate accounting data and a punched tape which can be used for further processing. Through coding it is possible to identify totals, sub-totals, account numbers, etc. It will produce 5, 6, 7 or 8-channel punched tape. Keyboard input may be either electric or manual. Victor Adding Machine Co., 3900 N. Rockwell St., Chicago 18, Ill. ■

HIGH SPEED PAPER TAPE PUNCH

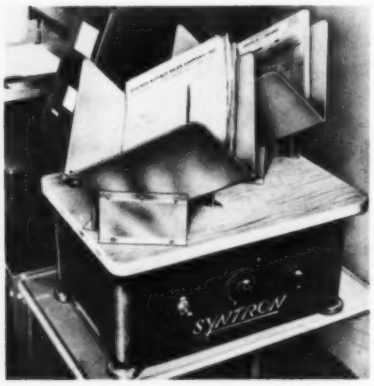
The Creed Model 3000 high-speed paper tape punch is designed for the direct recording of computer output data and will punch paper tape at a rate of 3,000 words per minute. The punch operates on a multi-wire start-stop basis incorporating revertive signalling arrangements for input control. ■

ELECTRONIC COMPUTING MACHINE

This small computer, built into a standard desk, is simple to operate and falls into the area between "electronic brains" and desk calculators. Figures are entered through a keyboard and computations are performed by an electronic unit stored in the desk. Results are printed on a paper tape. A wired program panel is used. Clary Corp., 408 Junipero, San Gabriel, Calif. ■

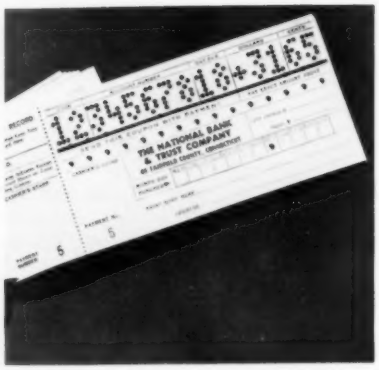
PUNCHED PAPER TAPE INPUT TO IBM 650

The IBM 46 Model 3 Tape-to-Card Punch and the 47 Model 3 Tape-to-Card Printing Punch enable the IBM 650 to accept five or eight channel paper tape directly as input. Up to three units may be used. This is only to be used as an input device, not an output device. Normal output card punching or printing are not affected. IBM, 590 Madison Ave., New York 22, N.Y. ■



PAPER JOGGER

The Syntron Company has announced a new double-bin vibrating Paper Jogger designed to reduce office paper handling costs. It aligns stacks of correspondence, invoices, order forms, data cards, or any of the other multitude of papers used in the modern office. The device is electromagnetically vibrated 3600 times a minute. Power of vibration is adjustable by a rheostat dial. Syntron Company, 1938 Black St., Homer City, Pa. ■



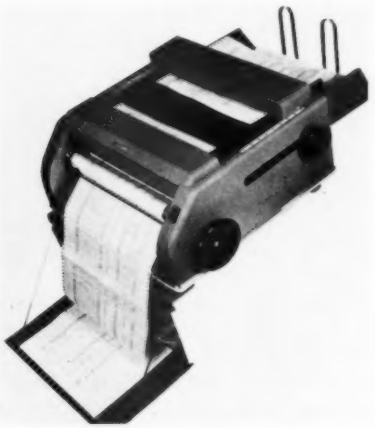
NEW AUTOMATIC READING DEVICE

National Bank & Trust Co. of Fairfield County, Stamford (Conn.) has just put into operation the first Cummins Perf-O-Reader to be used in New England.

This is the first electronic unit of the bank's Perf-O-Data equipment and will automatically feed the information from installment payment transactions into the bank's Remington Rand Univac Computer. Later in 1959, as the next step in the bank's automation program, a Cummins Perf-O-Sorter will be delivered that will automatically sort payment coupons by reading account numbers perforated in them.

Payment coupons with complete information for each payment marked in legible, perforated characters are now in wide use by virtue of their economy and efficiency. Over 30,000,000 people make payments accompanied by such coupons every month.

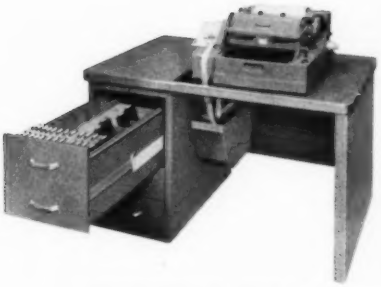
The Perf-O-Reader automatically reads and transcribes the same humanly legible perforated numbers that conveyed the payment information on the coupon to the customers making the payments and the tellers receiving them. It is the first practical device which reads the actual figures on a document rather than a separate code marking on punch. Thus it preserves all of the economies and advantages of the popular perforated payment coupons while providing automatic reading and input to automatic accounting. Cummins-Chicago Corp., 4740 Ravenswood Ave., Chicago 40, Ill. ■



PORTABLE FORMS DETACHER

A new type detacher that is portable for "on-the-spot" use has just been announced. The new "Speeditacher" embodies many new features. It has been especially designed for offices having: Small quantities of continuous forms to be detached; varying sizes of forms; and as a supplement during peak periods to heavy duty detaching equipment. Since the Speeditacher is portable it can be moved easily to wherever detaching work has to be done and can be set up on a desk or a table without special fittings or connections. It occupies a space of approximately 2′ by 2′.

Loading of the detacher has been simplified. Continuous forms are inserted into the detacher, like feeding forms into a typewriter. A collapsible feeding tray folds flat when not in use and is set up in seconds. Speeditacher is set for various form sizes by a simple twist of a size control wheel. It will accommodate forms from 3″ up to 11″ in depth and up to 16½″ wide and will detach over 100 forms in 8½″ size in a minute. Moore Business Forms, Inc., Niagara Falls, N. Y. ■



FLEXOWRITER FILE-DESKS

A new organized work station for use with Friden Flexowriter machines was recently unveiled by Shaw-Walker. Each desk and machine constitute a work station with finger tip accessibility to paper tape or edge-punched cards. The 60-inch desk holds up to 3,500 four-foot tapes or 39,000 edge-punched cards in 12 square feet. Automatic wobble blocks support the punched data and allow perfect reference flexibility. The desk top is cut out to facilitate tape or card handling. A sliding tape box holds the tape supply and supports tape catchers, winders or unwinders. Shaw-Walker, 405 Lexington Ave., New York 17, N. Y. ■

NEW ENTRY IN CONTINUOUS FORM FIELD

American Bank Note Company has announced the acquisition of new rotary web-fed equipment to produce continuous and unit set checks and other allied continuous forms. The company has long been in the forms field as a supplier of checks, stock certificates, foreign currency and other types of stock financial forms and paper. This new line of continuous forms for use with high-speed data processing will be marketed on a national basis. American Bank Note Co., 70 Broad St., New York 4, N. Y. ■

PATTERN RECOGNITION AND NEURON-NET METHOD

The Bell Telephone Laboratories in San Francisco announced a generalized scanner for use in studying pattern recognition systems. This tool, in conjunction with a digital computer, can be used to study any logical pattern-recognition system that could be devised. Also a new pattern-recognition system has been invented, employing a neuron-field system to transform complex patterns into simple patterns or dots. ■

TRANSACTER SYSTEM (TRANSACTION-TRANSMITTER)

A system of gathering all types of manufacturing control information and transmitting it to centrally located data processing centers for digestion by electronic computers was demonstrated publicly for the first time recently at the 5th Annual Electronics Conference of the American Management Association. Known as the Transacter System, the equipment closes the gap between the factory and the office in a major stride toward automation. It was developed by Stromberg Time Corporation, a subsidiary of General Time Corporation.

The pilot Transacter System is already installed and in operation at the U. S. Naval Gun Factory in Washington, D. C., where it will provide manufacturing data to an I.B.M. 650 computer. The company is now manufacturing other units for commercial installation in the consumer products and aircraft industries.

They intend to make the Transacter System available on a lease basis. Compilers will be leased at $450.00 per month each and Transacters at $95.00 per month. Stromberg Time Corporation, Main and Elm Sts., Thomaston, Conn. ■

FIRST IBM SERIES 50 INSTALLED

The first installation in the country of IBM Series 50 punched card accounting equipment was made at the home office of Louisiana Concrete Products, Inc. The installation consists of the following: 26 card punch, 82 sorter, 602 calculator and 402 accounting machine. The new equipment is being used by Lacrete (the company trade name) to prepare payroll checks, registers and distribution of payroll expenditures, as well as accounts payable. Projected applications include the preparation of all general ledgers. ■

TALK

The Model 2A-100 Computer Language Translator System was put into operation in Santa Monica, Calif. This system will translate information from the semi-automatic Ground Environment (SAGE) System into IBM 709 data, from 709 data into Teletype transmission or from the 709 into punched card formats. The Language Translator System was developed and built by Systems Development Corp. of Santa Ana, Calif.

■ ■ ■

PEOPLE AND PLACES

NATIONAL BUSINESS SHOW

The 1958 show was one of the greatest successes. Over 140,000 people toured five acres of exhibits. To occupy their time, there were 370 exhibits displaying over 500 different product lines. A special feature of interest was the visit by five Russian engineers who were sent specifically to view and inspect the exhibit. As a footnote, the estimated sales for the next twelve months, resulting from the show, are put at $2,500,000,000.

WESTERN UNION DATA

Walter P. Marshall, President of Western Union, disclosed that leasing of private wire systems to industry and government is now at a record annual rate of $51,000,000 — more than five times the revenue for leasing in 1948. There are presently over 2,000 different systems using 3,000,000 miles of circuits. The company has inaugurated automatic customer-to-customer telegraph exchange service between subscribers in the United States. The first step links New York with Chicago and 24 Canadian cities.

AUTOMATIC ELECTRIC DISTRIBUTES TELETYPE EQUIPMENT

Automatic Electric Sales Corp. of Illinois is now distributing products of Teletype Corp. This addition enables Automatic Electric to market a complete communication package. It will serve its customers abroad through Automatic Electric International and foreign subsidiaries.

NEW YORK TIMES COMPANY SUBSIDIARY SOLD

Litton Industries has purchased the Times Facsimile Corporation, a subsidiary of the New York Times. A. H. Sulzberger, Chairman of the Times and C. B. Thornton, Chairman of Litton, announced the transaction jointly. The purchase was for an undisclosed amount of cash. No personnel changes are planned.

Mr. Thornton commented: "The increasing demand for high-speed facsimile equipment makes the addition of the Times Fascimile capability and product lines an effective complement to Litton Industries' work in advanced electronics."

POGO

A new programming system, POGO (Program Optimizer for G-15 Operations), has been developed by Bendix Computer Division of Bendix Aviation for its Model G-15 computer. The G-15, from a simplified set of instructions, automatically rewrites the program for its own internal use. It also punches a tape of the program so that the original simplified set of instructions can be forgotten.

DATUM AT HIGH RANGE

A space testing range for the X-15 research airplane which will fly at 100 miles altitude is being readied in the Nevada wastelands by the National Aeronautic and Space Administration. The system was developed and built by the Electronic Engineering Company of California. It will give 600,000 answers per second to electronic questions concerning pilot safety and airplane condition when the rocket-powered X-15 roars into space.

High Range extends 400 miles across California and Nevada with a master control station at Edwards Air Force Base, Calif. A specially designed data recording system automatically converts radar information into a form which is utilized at the Air Force Flight Test Center's automatic data processing system, DATUM.

FARRINGTON ACQUIRES I.M.R.

Farrington Manufacturing Co. of Needham, Mass., acquired Intelligent Machines Research Corp. of Arlington, Va. Mr. Tetrick and Mr. Sheppard, presidents of the corporations, announced the acquisition. Mr. Sheppard will join the Farrington organization as Vice-President in charge of the I.M.R. division.

BELL TELEPHONE LABORATORIES

DR. MERVIN J. KELLY, Chairman of the Board of Directors of Bell Telephone Laboratories, retired on March 1. Dr. Kelly had spent 41 years with the Bell System in scientific and administrative service. In his honor the American Institute of Electrical Engineers and the Bell Labs have announced the establishment of an annual award for achievement in the field of telecommunicating to be known as the Mervin J. Kelly Award.

DR. KELLY ENGAGED BY IBM

Thomas J. Watson, Jr., President of International Business Machines Corporation, announced that DR. MERVIN J. KELLY (see above) retired Chairman and former President of Bell Labs has been engaged as a consultant in research and engineering. Dr. Kelly will report to Mr. Watson, who said: "IBM's research and engineering programs have expanded many fold in recent years. Dr. Kelly's broad knowledge and lifetime experience will be of great assistance to us in this important area of our business."

MAYOR BRANDT

MAYOR WILLY BRANDT of West Berlin, on his recent trip to New York, visited IBM World Trade Corp. headquarters. During the visit, Arthur K. Watson, president of the company, disclosed plans for an IBM office building in West Berlin's new commercial center, The Ernst Reuter Platz.

ELECTRO DATA

Burroughs Corporation's Marketing Director, E. S. McCollister, announced that W. R. LONERGAN has been appointed manager of product planning and market analysis for the ElectroData Division of Burroughs.

NEW VICE-PRESIDENT

Systematics, Inc., has announced the naming of VICTOR WHITE as Vice President. Mr. White, who established the first European computing center in Stockholm, Sweden, was previously with the Alwac Corp.

TELEMETER

A new plant, number four, has been leased by Telemeter Magnetics, Inc. of West Los Angeles to be used for

assembly of magnetic Modules used in computer memories and data handling systems. In addition, TRUDE C. TAYLOR, Vice President of Telemeter, disclosed that new orders are running 75% over 1958 and shipments will be 50% over 1958.

AMERICAN BANK NOTE COMPANY

American Bank Note Company has appointed W. RALPH ROCKHOLD as General Manager of Commercial Sales. He was previously associated with New England Business Forms, Inc.

POTTER

FREDERICK O. BISCHOFF and GERALD NEWBERG have been appointed Production Manager and Project Engineer respectively of Potter Instrument Co.

ROYAL McBEE CORP.

THEODORE B. JOHNSON has been appointed district manager of the Data Processing Division of Royal McBee Corp. in Toledo, Ohio. Mr. Johnson had been district manager of the Rockford, Illinois district.

MOORE PROMOTION

GORDON E. BOWER has been appointed Product Development Manager of the Product Research Section of the Research Division of Moore Corporation, Ltd. He will make his headquarters in the research offices in the Niagara Falls plant of Moore Business Forms, Inc. He was previously sales development manager of Moore's Eastern Division.

REMINGTON RAND

Sales activities for specialized applications of Univac computers in the Industrial fields are now under the direction of GORDON SMITH, recently named Director of Industry Marketing for Remington Rand Univac Division, Sperry Rand Corp. Mr. Smith, formerly associated with IBM in various executive management capacities, began his career in the tabulating machines and computer fields in 1940. In his new capacity Mr. Smith will have the assistance of A. F. DRAPER as manager of Industrial sales.

■ ■ ■

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CALENDAR of Coming Events

1959

April 21-24 National Association of Accountants, Los Angeles Chapter
Southern California Business Show
Ambassador Hotel, Los Angeles, Calif.

May 6-8 American Association of Collegiate Schools of Business
"41st Annual Meeting"
Hotel Fontainebleau, Miami Beach, Fla.
Contact: Maurice W. Lee, Dean of the School of Business Administration
University of North Carolina
Chapel Hill, No. Carolina

May 6-8 1959 Electronic Components Conference
IRE, EIA, AIEE and WCEMA
Benjamin Franklin Hotel, Philadelphia, Pa.
Contact: Bernard F. Osbahr
Electronic Industries
Chestnut and 56th Sts.,
Philadelphia 39, Pa.

May 8 Association of Records and Administrators (AREA)
"Second Annual Conference on Records Management"
Hotel Commodore, New York, N.Y.
Contact: Norman L. Gullifer, Conf. Chairman
New Jersey Bell Telephone Company
540 Broad Street
Newark 1, New Jersey

May 14-16 American Institute of Industrial Engineers
"Tenth Annual National Conference and Convention"
Biltmore Hotel, Atlanta, Ga.
Contact: A.I.I.E.
P. O. Box 5255, Station E
Atlanta 7, Ga.

May 24-27 National Office Management Association
"NOMA Annual Office Exposition and 40th International Conference"
Municipal Auditorium and Roosevelt Hotel
New Orleans, La.

June 4-6 IMS First National Meeting
Sponsor: Institute of Management Sciences
Congress Hotel, Chicago, Ill.

June 13-21 UNESCO
"First International Conference on Information Processing" (ICIP)
Contact: U. S. Committee for the First International Conference on Information Processing
Box 4999
Washington 8, D. C.

USEFUL LITERATURE

For your convenience in obtaining pertinent and helpful information on the latest equipment, forms, services and related products in the data processing field, we direct your attention to the following free literature available from the manufacturers. Circle the numbers pertaining to the literature you wish to receive on the Reader Service Card appearing elsewhere in "MA & DP." Mail the card to us and we will speedily forward your requests.

ENGINEERING DATA FOLDER provides information on simplified machine installation and vibration control. This new six page booklet answers such questions as: "How do I relocate machinery?" "The purpose and advantages of using Unisorb cement," and "Recommendations on the type, densities and thicknesses of Unisorb Pad required for various types of machines." . . . Unisorb Division, The Felters Company, 210 South St., Boston, Mass.

Circle No. 21 on Reader Service Card.

CATALOG 10 is a new 80-page catalog of auxiliary equipment for data processing departments. Illustrated with 227 photographs, it is organized for easy reference into separate sections for card filing, card handling, control panel storage and tape handling equipment. Available nationally, it also may be obtained from local Tab representatives or from Tab Products Co. head offices at 995 Market Street, San Francisco 3, Calif.

Circle No. 22 on Reader Service Card.

POGO (Program Optimizer for G-15 Operations), a new programming method, is described in the two-page bulletin, AR-118, available from Bendix Computer Division, 5630 Arbor Vitae Street, Los Angeles 45, Calif.

Circle No. 23 on Reader Service Card.

MAGNETIC CORE STORAGE PRODUCTS Catalog includes specifications for standard ferrite core and core product lines. This four-page illustrated brochure describes the manufacturer's ferrite storage and switch cores, core arrays, sequential and conversion types of core storage buffers, transistorized computer

memory modules, and Data Translators designed to provide compatibility between data systems utilizing different codes and formats . . . Telemeter Magnetics, Inc., 2245 Pontius Ave., Los Angeles 64, Calif.

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MATRIX MATH COMPILER manual, just published, will be of special interest to users of both the Univac I and II systems. The Computational Division of the U. S. Air Force did much of the original work in applying the solution of matrix problems to the computer. In 1955 Remington Rand published the results of these efforts in a manual called *The Matrix Routines.* Now, the Franklin Institute Laboratories has combined the Air Force routines and those developed by other Univac users with the concept of automatic programming. The result is the present publication, a comprehensive and simple system for the solution of complex problems. It will be applicable in the areas of Operations Research, pure scientific research, or engineering studies . . . Remington Rand, 315 Fourth Ave., New York 10, N. Y.

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FILM RENTAL CATALOG of the Industrial Management Society, 1959 edition, lists 77 films describing work simplification and industrial engineering training projects produced in leading American companies. The films, many in color and sound, are award winners in the Society's annual Methods Improvement Contest. Copies of the brochure, which explains the rental terms for the 16mm film, are available without charge by writing the Industrial Management Society, 330 S. Wells St., Chicago 6, Ill.

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PROCEDURE WRITING promises to be a much improved operation using a newly developed innovation called PRO-FORMS. This system of recording procedures is intended to reduce errors, minimize reruns and generally improve understanding in all levels of the data processing area, resulting in a more profitable utilization of equipment. Kits of forms and binders are available for IBM equipment only and come in a choice of sizes according to department needs. Also may be "custom-tailored." Complete description and prices . . . The Pro-Forms Company, P. O. Box 175, San Francisco 1, Calif.

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MISSILE TESTING AT WHITE SANDS——How flights of intermediate range rockets and guided missiles are measured by the Univac System is described in this booklet. Some 500 measurements are required for each flight of a guided missile, normally requiring 250 to 500 hours of computation. The Univac Scientific accomplishes each workload in a second, and can handle computations for as many as ten missile firings daily. The White Sands, New Mexico Range was the first made available to every branch of the military services, and to industry, for special testing. Details may be obtained by writing to the Management Controls Reference Library of Remington Rand, 315 Fourth Ave., New York 10, N. Y. or from local Remington Rand sales offices.

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FUNCTIONS OF DATA PROCESSING EQUIPMENT are described in this brochure which gives the functions of Univac data processing equipment, illustrates a broad range of basic data processing functions, and shows the specific equipment to execute them. Explained are the techniques of processing unit facts—whether in punched cards, perforated paper tape, or magnetic tape. Once recorded in cards or tape, these facts can be used over and over again. They are processed automatically by high-speed equipment to prepare accounting or statistical reports. Fifteen functions and the basic equipment which perform them are explained clearly and concisely in layman's language . . . Management Controls Reference Library, Remington Rand, 315 Fourth Ave., New York 10, N. Y., or local Remington Rand sales offices.

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TR 7 TAPE READER BROCHURE uses a clever question and answer format to explain the Ferranti Photoelectric Paper Tape Reader . . . Ferranti Electric, Inc., 95 Madison Ave., Hempstead, L. I., N. Y.

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TAPE STROBE describes the specifications and features of the magnetic tape tester manufactured by Scott Instruments Labs, Inc., 17 E. 48th St., New York 17, N. Y.

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CESCO CATALOG "L" is a completely new catalog on binders for marginal punched forms used in electronic data processing just released by the C. E. Sheppard Co. It is the first new catalog on the Cesco line in over two years and incorporates many improvements and innovations introduced during that period. Indexed by binder types, the new catalog has separate sections for thin prong and thin post styles as well as for Cesco's new flexible nylon thin-post line introduced earlier this year. It includes rapid-pricing tables for stock and special sizes . . . C. E. Sheppard Co., 44-38P 21st St., Long Island City 1, N. Y.

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CATALOG 21 is the 25th Anniversary Catalog of The Wright Line, Inc., prominent designer and manufacturer of data processing accessory equipment. The new 144 page catalog contains more than 800 items, of which 200 are new listings. Trucks, Files, Tape Handling and Storage Equipment, Binders and a number of other products are shown for the first time. For ease of reference, the catalog is divided into nine use categories, with individual indexing of each page. Over 600 photographs of products and installations are shown. In celebration of the company's 25th anniversary, a two-page story is included, highlighting the tremendous strides made in this field . . . The Wright Line, Inc., 160 Gold Star Blvd., Worcester 6, Mass., or local offices.

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"COMPUTER LANGUAGE TRANSLATOR FOR DATA PROCESSING SYSTEMS" is a new six-page brochure describing off-line processing of data to permit full utilization of computers and data processing systems. It details the ZA-100 which can solve 200 translation problems, end the punched card phase in computer/computer translations, and speed up conversions from one media to another. It also shows typical commercial, industrial, and scientific installations. . . . Electronic Engineering Co., 1601 E. Chestnut St., Santa Ana, Calif.

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OFFICE AUTOMATION, 4th Edition, and OFFICE AUTOMATION APPLICATIONS, 2nd Edition, by R. Hunt Brown, Automation Consultants, Inc., 155 Fifth Ave., New York 10, N. Y., 1958, $37.50 each

Office Automation is a reference work on equipment in the fields of EDP and IDP. The format and style are essentially the same as the three prior editions but this edition has, of course, been revised and updated. The contents have been enclosed in a restyled three-prong binder which enables easy updating of the book if one subscribes to the companion updating service which is available at extra cost.

The companion work, *Office Automation Applications*, is again basically the same in format and style but has incorporated revisions and additions which occurred since the publication of the first edition. This book contains actual case study applications of EDP and IDP by the companies involved. These studies include pertinent remarks as to the ease or difficulty of commencing computer applications, as well as evaluations of their success. As with the *Office Automation* book, an updating service is available on a subscription basis at extra cost.

COMPUTERS: Their Operation and Application by Edmund C. Berkeley and Lawrence Wainwright, Reinhold Publishing Corp., 430 Park Ave., New York, N. Y., 366 pages, 1956, $8.00

The authors have divided the book into eight main sections and subdivided each section. It features both digital and analog computers, devoting a section to each. Anyone concerned or interested in the field of computers will find these two sections enlightening since an analysis of cost, advantages and reliability are discussed. Although the publication is three years old, the section on large scale automatic digital computers deals with currently available IBM and UNIVAC computers. Under section VIII: Miscellaneous, are very worthwhile subsections, some of which are References, Roster of Organizations Making Automatic Computing Machines and a Glossary of Terms and Expressions.

DATA PROCESSING, 1958 Proceedings, Charles H. Johnson, Editor, National Machine Accountants Association, 208 S. Main St., Paris, Ill., 1958, 412 pages, $10.00

These are the proceedings of the 1958 NMAA convention. It renders a complete account of meetings, seminars, speeches and addresses. The application write-ups and workship seminars have the most value, if a hierarchy of importance is believed needed. The problems of industries were discussed and in many instances solutions to these problems were attained. Data Processing 1958 is a worthwhile reference guide for NMAA members and the industry at large.

BASICS OF DIGITAL COMPUTERS, Vols. 1, 2, 3, by John S. Murphy, John F. Rider Publisher, Inc., 116 W. 14th St., New York 11, N. Y., 385 pages (3 Vols.), $7.95

Designed as a step-by-step instructional manual, this book can be easily followed and understood without the aid of a trained teacher or instructor. Volume One begins with a general review of computer developments, moves into binary data representation and finally into elementary automatic calculation, programming and control. In Volume Two the pace accelerates by moving into internal circuits and special systems, highlight-

ing the materials used, such as diodes, tubes and magnetic cores. Finally Volume Three explains in detail the major logical systems in a computer and discusses input-output units.

The work is thoroughly illustrated with simplified and easily-followed diagrams and examples.

CUTTING THE COST OF YOUR EDP INSTALLATION written and published by Canning, Sisson and Associates, 1140 S. Robertson Blvd., Los Angeles, Calif., 1958, 175 pages and Check Lists.

Canning and Sisson have compiled a worthwhile reference text on the installation of a large or medium scale computing system. They have accomplished this by the case study method. The principles outlined were reached after discussing the problem of EDP installation with a number of companies that had gone through the experience. These organizations were in the best position to render advice as well as facts concerning this important and costly step. Even if an organization is not large enough to consider a computer, large or medium scale, the principles defined in this work are pertinent to any type of automatic office equipment installa...

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INDEX TO ADVERTISERS

The Baltimore Business Forms Co.	43
Business Electronics, Inc.	46
Clarkson Press, Inc.	4
Gille Associates, Inc., Book Division	37
Globe Ticket Company	11
Haloid Xerox, Inc.	21
International Business Machines Corporation	14
O. W. Markes, Manufacturer	31
Moore Business Forms, Inc.	Second Cover
Prestoseal Manufacturing Corporation	36
Scriptomatic, Inc.	24
Service Bureau Corporation	9
Shaw-Walker	46
VISIrecord, Inc.	47
Wheeldex & Simpla Products, Inc.	Back Cover

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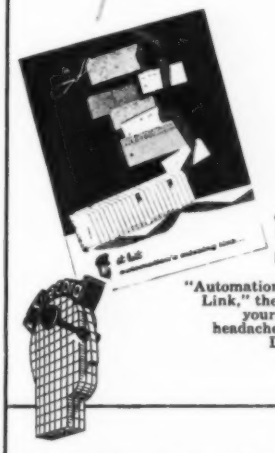

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EDITORIAL

Selecting Programmers for Business Computers

The Brain behind the "Brain"—the Programmer

By Eugene F. Murphy

AN ELECTRONIC COMPUTER is merely a slave that faithfully carries out a series of simple instructions which could be easily understood by an eight year old child. Its usefulness, and the appellation *"giant brain,"* result from its extraordinary memory, speed and accuracy.

The brain behind the *"brain"* is a human one. Someone once said that an automobile is no safer than the nut that holds the wheel. The ability of a computer to get you somewhere depends on a similar *"nut"* and disastrous financial accidents sometimes do occur.

A programmer is a person who tells the machine what the problem is, and how to solve it. Computers require machine operators similar to those used in conventional punched card installations. The programmer, however, is the prime mover. He is a composite of tab supervisor, systems analyst and control panel wirer.

How to select a programmer? There are many considerations, and the *least* important of these are education and mathematical background.

A formal education may be some indication of a person's abilities but it is not essential for programming. Business applications seldom involve higher mathematics; the average problem is fairly simple in content. A background in mathematics or accounting is certainly an asset, but computer users have learned not to rule out an applicant simply because he does not have a college degree.

Programming is an art as well as a science and experience is a definite asset. But a person who makes a good programmer is a person who can learn to program very rapidly. You may want a few experienced people in a programming group but your continuing need will best be met by training new people. The average programming school is of only a few weeks duration. A programming group would probably benefit if it included people who had experience on other computers since then they would bring with them fresh techniques.

A good programmer is a person who likes to program; he should be enthused about the job. He should attack problems methodically, thoroughly, cautiously — carelessness is deadly. There are a great number of unmethodical people in the world who are creative; they might make good company presidents, but poor programmers.

There are many types of intelligence. The programming aptitude tests available from equipment manufacturers and others are somewhat similar to I.Q. tests and seem to be quite reliable. What is needed is a certain type of brightness, not depth of thought. Programming is unfortunately done under some pressure and what is needed is a rather quick, workable solution and not a philosophy.

Experience with conventional punched card equipment can be very advantageous. The main reason for this is the similarity in the method of approaching problems. As stated previously, programming is part systems analysis, and good procedures are equally important whether they be designed for an electronic computer, a punched card accounting machine, or paper and pencil. Any person who has worked in a machine accounting installation has become well aware of the importance of accuracy and controls, of the fact that machines can break down, of the necessity for changes and additions in established procedures.

The most important experience a prospective programmer can have is that gained within his own company. It is easier for a person who knows the business to learn programming than it is for a person who knows programming to learn the business. Promotion from within has many advantages. It is good policy in any company that is installing an electronic computer to allow as many present employees as possible to take programming aptitude tests.

From a short range standpoint it would obviously be pleasant to be able to hire a complete staff of capable and experienced programmers. But the shortage of programmers today will become even more acute in the future and every company should realize its obligation to train new programmers. Luring programmers away from their present companies, perhaps through higher wages, will not solve the shortage problem. ■

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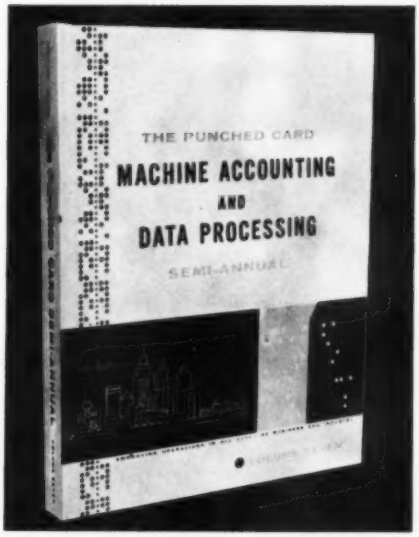

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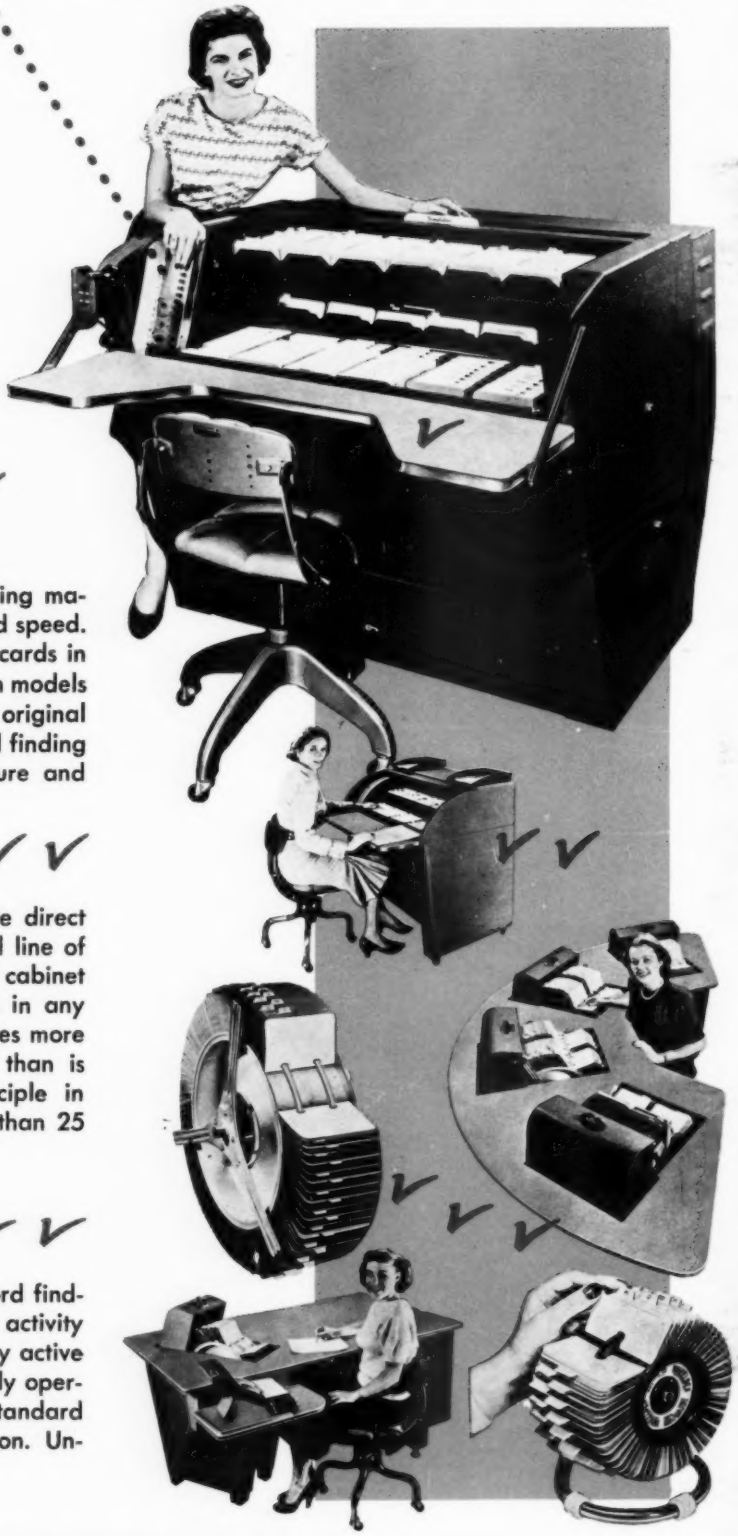

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